21 · Signs on Printed Topographical Maps, ca. 1470–ca. 1640

Catherine Delano-Smith

Although signs have been used over the centuries to record and communicate information on maps, there has never been a standard term for them.[1] In the Renaissance, map signs were described in Latin or the vernacular by polysemous general words such as "marks," "notes," "characters," or "characteristics." More often than not, they were called nothing at all. In 1570, John Dee talked about features' being "described" or "represented" on maps.[2] A century later, August Lubin was also alluding to signs as the way engravers "distinguished" places by "marking" them differently on their maps.[3]

Today, map signs are described indiscriminately by cartographers and map historians as signs or symbols, despite the inappropriateness of the word "symbol" in most cartographic contexts. Semioticists and philosophers are more disciplined. Firth, for example, talks about a symbol's having a "certain *ineffectuality*"—meaning that "a 'symbolic' gesture does not attempt to get immediate concrete effects" in the way a sign does.[4] Even in these fields, though, not all attempts to instill order into the deployment of the two words have been successful; Eco comments on the attempt to define "symbol" in a technical lexicon as "one of the most pathetic moments in the history of philosophical terminology."[5] Apart from Harley, who applied the distinction between sign and symbol to the first and third of Erwin Panofsky's levels of meaning in works of art, and Woodward, who has reflected on the nature of cartographic sign systems both in the present volume and elsewhere, the majority of cartographers and historians of cartography are not so careful with their words.[6] One influential handbook of mapping terms offers no overall definition of a symbol, referring indiscriminately—under yet another confusing heading, that of "conventional

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Abbreviations used in this chapter include: *Plantejaments* for David Woodward, Catherine Delano-Smith, and Cordell D. K. Yee, *Plantejaments i objectius d'una història universal de la cartografia = Approaches and Challenges in a Worldwide History of Cartography* (Barcelona: Institut Cartogràfic Catalunya, 2001). Many of the maps mentioned in this chapter are illustrated and/or discussed in other chapters in this volume and can be found using the general index.

1. In this chapter, the word "sign," not "symbol," is used throughout. Two basic categories of map signs are recognized: abstract signs (geometric shapes that stand on a map for a geographical feature on the ground) and pictorial signs. The huge variety of the latter derived from the various permutations of the composition, perspective, and style of individual signs.

2. "Geographie teacheth wayes, by which . . . the Situation of Cities, Townes, Villages, Fortes, Castells, Mountaines, Woods, Hauens, Riuers, Crekes . . . may be described and designed [on maps] . . . and most aptly to our vew may be represented." See John Dee, *The Mathematicall Praeface to the Elements of Geometrie of Euclide of Megara (1570),* intro Allen G. Debus (New York: Science History Publications, 1975), Aiiii.

3. Augustin Lubin, *Mercure geographique; ou, Le guide du curieux des cartes geographiques* (Paris: Christophle Remy, 1678), 134: "The engravers are careful to distinguish these towns from the others, placing a double Cross over the Archbishoprics and a single Cross over the Bishoprics." The circumlocutions continued into the eighteenth century. John Green explained that "the Sea-Coasts are known by a thick Shadowing, the Sea is all white. Rivers are mark'd by a full black serpentine Line, and sometimes by two lines. Lakes are denoted by irregular Lines shadow'd inwards." See *The Construction of Maps and Globes* (London: Printed for T. Horne, 1717), 9.

4. Raymond William Firth, *Symbols: Public and Private* (London: Allen and Unwin, 1973), 74–75, cited approvingly by Umberto Eco, *Semiotics and the Philosophy of Language* (London: Macmillan, 1984), 132.

5. Eco, *Semiotics,* 130. For a summary of the debate in linguistic philosophy between followers of Fernand de Saussure and those of Charles Sanders Peirce through the twentieth century, and its implications for historians of cartography, see David Woodward, "'Theory' and the *History of Cartography,*" in *Plantejaments,* 31–48, esp. 39–41 and n. 19. In social anthropology (ethnography), the notion of a coherent "symbol system" lies at the core of the study of different cultures; see Clifford Geertz, *The Interpretation of Cultures: Selected Essays* (New York: Basic Books, 1973), 17–18, 46–47, 208–9, and 215–20.

6. J. B. Harley, "Texts and Contexts in the Interpretation of Early Maps," in *From Sea Charts to Satellite Images: Interpreting North American History through Maps,* ed. David Buisseret (Chicago: University of Chicago Press, 1990), 3–15, republished in J. B. Harley, *The New Nature of Maps: Essays in the History of Cartography,* ed. Paul Laxton (Baltimore: Johns Hopkins University Press, 2001), 31–49, esp. 36–37 and 47–48; Woodward, "'Theory' and *The History of Cartography*"; and Woodward's introduction to this volume.

sign"—to signs and symbols in a chapter headed "Symbolism" but dealing in effect with map signs.[7] In an international glossary of cartographic terms, definitions are complicated by linguistic differences.[8] Some modern writers have simply ducked the issue. In Robinson and Petchenik's discussion of symbolism in the context of the relationship between language and (map) image, they avoid using the word "sign" for maps altogether; instead they refer to "representational techniques" and to "unitary graphic elements" that the cartographer calls "map marks."[9] In most cartographic textbooks, the word "symbol" is used to denote a map sign without comment.[10]

The semantic waters are muddied still further when "conventional signs" are referred to in a premodern context. No evidence has been found of the use of that term before the beginning of the nineteenth century. In 1802, in France, a commission set up by the Dépôt de la Guerre to establish "ways of simplifying and making uniform the various signs that are used on maps to express the accidents of terrain" used the term in its report, boldly heading the engraved plate that illustrated the signs that are to be used "Signes conventionels."[11] Until then, French mapmakers such as César-François Cassini de Thury were still alluding obliquely, in the manner of their Renaissance predecessors, to the "choice of models [engravers] had to follow to express woods, rivers [and] . . . the configuration of the region."[12] In Germany, Johann Georg Lehmann was using *Zeichen* in the traditional manner.[13] When William Siborne translated Lehmann's essay into English, he selected the word "sign" for Lehmann's *Zeichen*.[14]

The notion that there was such a thing as a conventional sign in the context of premodern printed topographical maps is just one of the myths concerning map signs that colors the modern reader's preconception of map signs, in the Renaissance in particular and in the history of cartography in general. The evidence presented in this chapter speaks for itself in rebutting this particular myth. It also contradicts a number of other long-cherished misconceptions. These are briefly summarized in the paragraphs that follow.

A number of myths underlie modern writing about map signs. One is that Renaissance map signs were rational and ordered, unlike medieval signs, which were artistic and chaotic. That that was not the case is clear from the maps themselves. As will be shown in this chapter, Renaissance signs were far from standardized. Modern authors who think they see homogeneity in, for example, Abraham Ortelius's maps must have been looking at other features—the style of lettering, perhaps, or the decoration of cartouches and the vignettes of ships and sea monsters.[15] They certainly cannot have looked closely at the signs or reflected on Renaissance publishing economics. During the Renaissance, profits were made by employing the cheapest labor to make slavish copies, not by paying top-quality draftsmen and craftsmen to think how to homogenize disparate signs on source maps to a single specification, a policy amply recorded in the mindless process of copying and recopying from sources sometimes far removed from the original.[16]

Another enduring myth insists that the introduction of printing led to fundamental changes in the visual appearance of Renaissance maps.[17] Again, the evidence fails to support such a notion. Nonpictorial signs were used on

7. Helen 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).

8. *Multilingual Dictionary of Technical Terms in Cartography* (Wiesbaden: F. Steiner, 1973), 88–89 and 92–93. The *Dictionary* was prepared under the chairmanship of E. Meynen for Commission II of the International Cartographic Association.

9. Arthur Howard Robinson and Barbara Bartz Petchenik, *The Nature of Maps: Essays toward Understanding Maps and Mapping* (Chicago: University of Chicago Press, 1976), 52 and 57, respectively.

10. See, for example, Arthur Howard Robinson et al., *Elements of Cartography,* 6th ed. (New York: John Wiley and Sons, 1995), 11, and the still much-used David Greenhood, *Down to Earth: Mapping for Everybody* (New York: Holiday House, 1944), 75 (later editions published under the title *Mapping*).

11. *Mémorial du Dépôt Générale de la Guerre, imprimé par ordre du ministre: Tome II, 1803–1805 et 1810* (Paris: Ch. Picquet, 1831), 1–40 and pls. 3–21. François de Dainville, *Le langage des géographes: Termes, signes, couleurs des cartes anciennes, 1500–1800* (Paris: A. et J. Picard, 1964), 58, also cites the work of the 1802 commission as the first publication of the term *signes conventionels*.

12. César-François Cassini de Thury, *Description géométrique de la France* (Paris: J. Ch. Desaint, 1783), 18.

13. Johann Georg Lehmann, *Darstellung einer neuen Theorie der Bezeichnung der Schiefen Flächen im Grundriss oder der Situationzeichung der Berge* (Leipzig: J. B. G. Fleischer, 1799).

14. William Siborne, *Instructions for Civil and Military Surveyors in Topographical Plan-Drawing* (London: G. and W. B. Whittaker, 1822), 23–24 and pl. 4. Eila Campbell suggests that it was Lehmann who made "the first attempt [in Germany] to set down a full range of symbols necessary for describing the many features of the landscape" and reproduces one of Lehmann's engravings; see Eila M. J. Campbell, "Lehmann's Contribution to the Cartographical Alphabet," in *The Indian Geographical Society Silver Juiblee [*sic*] Souvenir and N. Subrahmanyam Memorial Volume,* ed. G. Kurian [Madras: Free India Press, 1952], 132–35 and fig. 2.

15. Commenting on the maps in Christophe Tassin's atlas of France, Pastoureau notes: "The workmanship, however, is homogeneous, with a roundness in the lettering, cartouches decorated with grotesque figures, and ships in the seas. Thanks to these characteristics [the maps] are identifiable at first glance." See Mireille Pastoureau, *Les atlas français, XVI^e^–XVII^e^ siècles: Répertoire bibliographique et étude* (Paris: Bibliothèque Nationale, Département des Cartes et Plans, 1984), 437. Similarly, those who suggest that printing brought standardization are not referring to map signs; see, for example, Elizabeth L. Eisenstein, *The Printing Press as an Agent of Change: Communications and Cultural Transformations in Early-Modern Europe,* 2 vols. (Cambridge: Cambridge University Press, 1979), 1:80–88.

16. As exemplified in signs for antiquities. In figure 21.53, compare the signs taken from Mercator's map of Flanders (1540) and Simeoni's map of the Auvergne (1560) with their reproduction on seventeenth-century copies.

17. Skelton referred to an "intellectual revolution effected by a technical and commercial innovation"; see R. A. Skelton, *Decorative Printed*

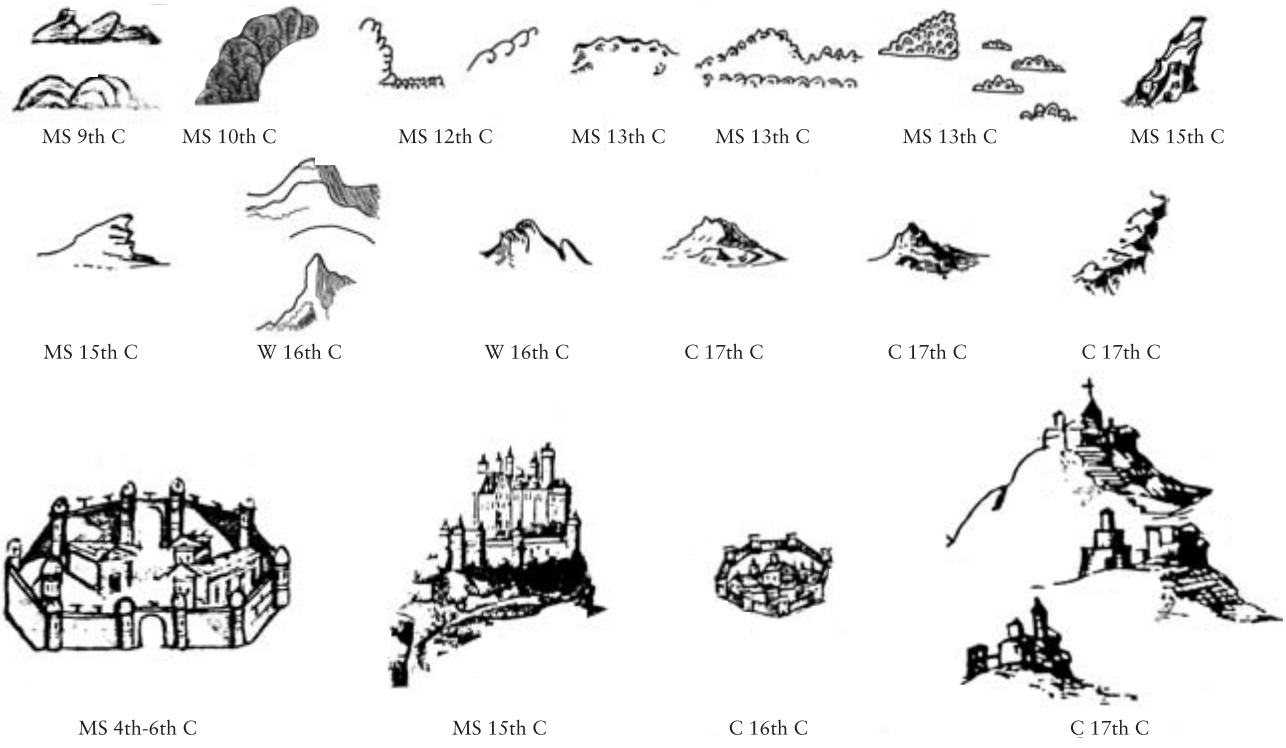


FIG. 21.1. CONTINUITY FROM MANUSCRIPT TO PRINT. The first two lines show a selection of manuscript (MS) and printed (W = woodcut; C = copperplate) hill signs from the ninth century to the seventeenth century (1626); the third line shows settlement signs from before the sixth century to the early seventeenth century (1617).

Renaissance maps as on medieval maps, and medieval ways of portraying landscape features continued to provide the basis for the majority of Renaissance pictorial signs. Any comparison of signs on medieval manuscript maps with those on Renaissance printed maps will reiterate the theme of continuity, not change, from one period to the other, a conclusion that should come as no surprise, for it is normal to base the new on the old (fig. 21.1).[18] In fact, the express aim in early book printing was to imitate as closely as possible the appearance of the manuscript exemplar, and there is nothing to suggest that a different attitude was taken toward the printing of maps.[19] From the beginning to the end of the Renaissance, map signs were drafted on paper, traced or copied onto woodblock or copperplate, and there cut or engraved freehand. There may have been a few attempts in the early years of map printing to experiment with ready-made tools for certain signs.[20] When ready-made stamps

Maps of the 15th to 18th Centuries (London: Staples Press, 1952), 5. For a similar emphasis on the role of printing, see Elizabeth L. Eisenstein, *The Printing Revolution in Early Modern Europe* (Cambridge: Cambridge University Press, 1983), and idem, *Printing Press*. The notion that a single technological invention can be seen as the root cause of a whole range of cultural and socioeconomic changes, much less as catalyst of a "revolution," has been widely challenged, however.

18. E. D. Hirsch, in *Validity in Interpretation* (New Haven: Yale University Press, 1967), 104, points to the "tendency of the mind to use old types as the foundations for new ones." The practice of reusing and adapting also fits Lévi-Strauss's concept of *bricolage;* see Claude Lévi-Strauss, *The Savage Mind* (Chicago: University of Chicago Press, 1966), 16–33. The principle of the *bricoleur* is "always to make do with 'whatever is at hand'" (p. 17).

19. Martin refers to two copies of a missal, one printed in 1482 and the other remaining in manuscript, that "are true twins" scarcely distinguishable one from another (both now in Lyons, Bibliothèque Municipale); see Henri-Jean Martin, *The History and Power of Writing,* trans. Lydia G. Cochrane (Chicago: University of Chicago Press, 1994), 231. See also Adrian Wilson, *The Nuremberg Chronicle Designs: An Account of the New Discovery of the Earliest Known Layouts for a Printed Book. The Exemplars for the Nuremberg Chronicle of 1493* (San Francisco: Printed for the members of the Roxburgh Club of San Fransisco and the Zamorano Club of Los Angeles, 1969), and Sandra Hindman, "Cross-Fertilization: Experiments in Mixing the Media," in *Pen to Press: Illustrated Manuscripts and Printed Books in the First Century of Printing,* by Sandra Hindman and James Douglas Farquhar ([College Park]: Art Department, University of Maryland, 1977), 101–56, esp. 102. See also Lilian Armstrong, "Benedetto Bordon, *Miniator,* and Cartography in Early Sixteenth-Century Venice," *Imago Mundi* 48 (1996): 65–92.

20. The pictorial town signs on Nicolaus Cusanus's Eichstätt map of Europe (1491) may be an example of one such experiment. It has been suggested that these were created by the deployment of "between ten and twenty punches"; see Tony Campbell, *The Earliest Printed Maps, 1472–1500* (London: British Library, 1987), 44 and 46 (fig. H); ibid., "Portolan Charts from the Late Thirteenth Century to 1500," in *HC* 1:371–463, esp. 391 n. 189; David Woodward, "The Study of the Italian Map Trade

were later used for an entire pictorial sign by a land surveyor for his manuscript estate maps, the context suggests that the aim was to economize on his own labor, not to standardize the sign on the map; it may be telling, in this respect, that many of the stamped settlement signs were subsequently individualized by hand.[21]

Finally, two other myths that have clouded the history of map signs, especially in the older literature, should be mentioned. There is the idea that signs printed from a woodblock are different from those printed from a copperplate. Verner suggested that "the nature of the material imposed severe restrictions on the amount and kind of data that the cartographer could present" on a woodcut map, and that woodcutting limited the mapmaker's powers of expression.[22] Skelton asserted that "with the maturity of copper-plate engraving in the 16th century, the old symbols were refined and elaborated," although he produced nothing to support the claim.[23] A glance through the arrays of printed map signs illustrating the present chapter, however, quickly disproves Lynam's statement that "the art and taste of the map-engraver substituted neat conventional symbols for the manuscript pictures."[24] The final myth, also contradicted by the evidence presented in this chapter, is that the larger size of a copperplate relative to a woodblock allowed the mapmaker using it to show a much greater amount of information. On the contrary, many of the maps noted for their exceptional wealth of geographical content and range of map signs are woodcuts.[25] In short, whenever the same map exists as a woodcut and a copperplate, we find nothing to distinguish them regarding map content or the way this was portrayed.[26]

The Absence of Standardization

Even had technical factors encouraged uniformity in Renaissance map signs, there was no organizational mechanism directing mapmakers in their selection and use of signs on topographical maps. There were no cartographic craft guilds, professional institutions, or commercial companies to draw up rules or to issue instructions in the way there may have been for marine charts. None of the surveying or general didactic treatises say anything about map signs.[27] On the contrary, in the cultural ethos of the Renaissance, anything threatening to curb a mapmaker's freedom to express landscape features as he saw fit would have run counter to the humanist culture of personal responsibility. It may be supposed that those ultimately re-

in the Sixteenth Century: Needs and Opportunities," in *Land- und Seekarten im Mittelalter und in der frühen Neuzeit,* ed. C. Koeman (Munich: Kraus International, 1980), 137–46, esp. 142–43; and Robert W. Karrow, *Mapmakers of the Sixteenth Century and Their Maps: Bio-Bibliographies of the Cartographers of Abraham Ortelius, 1570* (Chicago: Speculum Orbis Press, 1993), 132–35. According to Karrow, the punches were taken from Rome, where they had been used on the 1478 edition of Ptolemy, to Eichstätt, then returned to Rome for use again in 1507.

21. In 1625 Paulus Aretinus used thirteen stamps, possibly wooden, for different types of settlements and for wells on a map of the estate on which the town of Zábřeh was situated, as reported by Karel Kuchař in a New Year's card titled "Dodatek k Aretinové mapé Zábřezského okoli z roku 1623," published by the now-defunct Cabinet pro Kartographii Čsav / Cartographic Cabinet of the Czechoslovakia Academy of Sciences (1960). I am most grateful to Ludvík Mucha for a photocopy of this four-page leaflet and for confirming publication details. For further details on Aretinus's map and examples of about the same time from England, see Catherine Delano-Smith, "Stamped Signs on Manuscript Maps in the Renaissance," *Imago Mundi* 57 (2005): 59–62.

22. Coolie Verner, "Copperplate Printing," in *Five Centuries of Map Printing,* ed. David Woodward (Chicago: University of Chicago Press, 1975), 51–75, esp. 51; see also Franz Grenacher, "The Woodcut Map: A Form-Cutter of Maps Wanders through Europe in the First Quarter of the Sixteenth Century," *Imago Mundi* 24 (1970): 31–41.

23. Skelton, *Decorative Printed Maps,* 11.

24. Edward Lynam, "Period Ornament, Writing and Symbols on Maps, 1250–1800," *Geographical Magazine* 18 (1945): 323–26, esp. 324. Few "neat conventional symbols," however, are found among the signs discussed in this chapter.

25. For example, maps by Pieter van der Beke (Flanders, 1538), Olaus Magnus (*Carta marina,* 1539), Eufrosino della Volpaia (map of the Roman Campagna, 1547), Jean Jolivet (France, 1560), and Philipp Apian (Bavaria, 1568). The relatively few copperplate maps outstanding for range of content include Marin Helwig's map of Silesia (1561), Paul Fabricius's of Moravia (1569), Nicholas Christopher Radziwill's of Lithuania (1613), Jubilio Mauro's of Sabina (1617), and João Baptista Lavanha's of Aragon (1620).

26. Compare Wolfgang Lazius's maps of Hungary (1556) and Austria (1561), and see chapter 61 in this volume. See also Wolfgang Lazius, *Karten der Österreichischen Lande und des Königreichs Ungarn aus den Jahren 1545–1563,* ed. Eugen Oberhummer and Franz Ritter von Wieser (Innsbruck: Verlag der Wagner'schen Universitäts-Buchhandlung, 1906). The map of Hungary is a woodcut of admirable clarity executed by Michael Zimmermann; the map of Austria was printed from a plate etched by Lazius himself (Florio Banfi, "Maps of Wolfgang Lazius in the Tall Tree Library in Jenkintown," *Imago Mundi* 15 [1960]: 52–65, esp. 57). Despite the different visual impact of each, and stylistic differences in the way some features are drawn (angular or rounded buildings in settlement signs, for example), the signs are the same as regards basic composition, perspective, and semiotic style. For an example of a map printed in both media, see Giacomo Gastaldi's map of Piedmont, which first appeared in 1555 as a woodcut (presumably cut by Matteo Pagano in Venice) measuring 52.5 × 76.0 cm, and then in the following year as a copperplate engraved by Fabio Licinio (also in Venice) in a slightly reduced format measuring 37.8 × 50.1 cm; see Karrow, *Mapmakers of the Sixteenth Century,* 228.

27. In England, William Leybourn (Leybourne), *The Compleat Surveyor: Containing the Whole Art of Surveying of Land* (London: Printed by R. and W. Leybourn for E. Brewster and G. Sawbridge, 1653), was the first to offer a model of how, on a manuscript estate map, the title and major ancillary features such as coats of arms, scale bars, and compass roses were to be enhanced, but nothing is said even here about how the manor house and other buildings, hedges, woodlands, arable lands, pastures, and relief were to be depicted. An earlier Dutch manuscript manual from Delft for estate surveyors, dating from 1554 or 1555 and compiled by a Pieter Resen, likewise specifies that pastures are to be colored in green and arable ("filled with black dots"), but makes the assumption that surveyors knew how to portray the "fences, trees, roads, paths and houses" that were also to be shown on the estate survey, presumably pictorially; see Peter van der Krogt and Ferjan Ormeling, "16e-eeuwse legendalandjes als handleiding voor kaartgebruik," *Kartografisch Tijdschrift* 27, no. 4 (2001): 27–31.

FIG. 21.2. LACK OF STANDARDIZATION. For the first state of Tilemann Stella's woodcut map of the Holy Land (1557), adjacent blocks or plates were cut by different workmen using noticeably different shading for the rivers.
Size of the detail: ca. 9 × 27 cm. Photograph courtesy of the Öffentliche Bibliothek der Universität, Basel (Kartensammlung AA 104).

sponsible for putting each map on the market would have been anxious to ensure the salability of the product across a wide social spectrum, but there is nothing to suggest that conscious efforts were made to ensure that the maps would be easily understood by all and sundry, still less that the signs conformed to any model, either on the maps produced by a single mapmaker or on those produced by different mapmakers. Nor does it seem to have mattered that adjacent sheets were printed from blocks or plates produced by engravers with different ways of representing geographical features (fig. 21.2). In short, evidence for the modern cartographer's notion that "mapmaking . . . demands a degree of uniformity and repetition of symbols" or that "the code of marks must be consistent" in form all over a map cannot be found on Renaissance maps.[28]

The situation had not changed by 1693, when the author of a small guide to surveying and mapmaking, both topographical and marine, warned that it was not always easy to know what the mapmaker intended: the signs, he said, "are arbitrary and . . . each [mapmaker] uses them according to his whim."[29] Two decades later, another writer grumbled that while the geographers of his day usually made pictorial signs "speak for the things which they are meant to signify," other types of signs were given "whatever significance pleases them," and he wished that "all came to have the same meaning."[30] This kind of inconsistency is exactly what is found on printed topographical maps throughout the Renaissance. A small open circle, for example, could be used as a location dot (the point from which the distance between one settlement and another was measured) or to represent a capital city, a village with a parish church, a village without a parish church, or iron deposits. Similarly, an Islamic crescent might indicate places in Hungary held by the Turks, towns in France with a parliament, or English market towns.

Such semiotic anarchy does not make the modern researcher's task easy when there is no explanation of the meaning of the signs. The vast majority of Renaissance maps do not carry even a short-word key, and fewer still were accompanied by an explanatory sheet or booklet.[31] Even where a key was supplied, it is rare that more than five or six items are identified. The fourteen-item key on Philipp Apian's map of Bavaria (1568) and Caspar Henneberger's key of eighteen graphic signs and nine alphabetic codes on his map of Prussia (1584) are outstanding exceptions in the entire period (fig. 21.3).

Standardization implies using the same sign in the same way for the same feature on every map, at the very least on maps of the same genre. It also provides a yardstick against which "good" and "bad" practice can be measured.[32] The lack of standardization on Renaissance printed maps applies to the whole period, to topographical maps produced for atlases as much as to maps produced separately, and to both mapmakers and map engravers. Christopher Saxton worked alone in the 1570s to compile thirty-four county maps in the space of five years. We do not know what each of his draft maps looked like when it was passed on for engraving or how consistent he was, but a check of the twenty-two maps that bear an engraver's name bears out the point.[33] Among them, the six identifiable engravers shaded the sea in only two different ways, but they employed five different styles of shading in seven different hill signs and styled park signs

28. Elizabeth M. Harris, "Miscellaneous Map Printing Processes in the Nineteenth Century," in *Five Centuries of Map Printing,* ed. David Woodward (Chicago: University of Chicago Press, 1975), 113–36, esp. 114.

29. Jacques Ozanam, *Méthode de lever les plans et les cartes de terre et de mer, avec toutes sortes d'instrumens, & sans instrumens* (Paris: Chez Estienne Michallet, 1693), 176.

30. M. Bouchotte, *Les règles du dessein et du lavis* (Paris: Chez Claude Jombert, 1721), 100. One of the earliest treatises to give a detailed account of map signs was Lubin, *Mercure geographique.*

31. For an account of the seven different ways the meaning of map signs was given before 1600, see Catherine Delano-Smith, "Cartographic Signs on European Maps and Their Explanation before 1700," *Imago Mundi* 37 (1985): 9–29.

32. According to Charles Altieri, "An Idea and Ideal of a Literary Canon," in *Canons and Consequences: Reflections on the Ethical Force of Imaginative Ideals,* by Charles Altieri (Evanston: Northwestern University Press, 1992), 21–47, first published in *Critical Inquiry* 10 (1983): 37–60, standardization institutionalizes ideals in establishing a canon of the best works. Altieri also notes that the accepted corpus, or canon, acts as "a *grammar*—an institutional means of exposing people to a range of idealized attitudes . . . a means for reinforcing a given set of social values" (p. 27). In modern cartography, standardization is taken for granted. It is evidently assumed that no (good) modern map would fail to follow the requisite pattern, for Alan M. MacEachren has a only a single entry under the heading "standardization" in the index of his authoritative analysis of modern cartography, *How Maps Work: Representation, Visualization, and Design* (New York: Guilford, 1995), 510.

33. The data for Saxton are derived from Ifor M. Evans and Heather Lawrence, *Christopher Saxton, Elizabethan Map-Maker* (Wakefield, Eng.: Wakefield Historical Publications and Holland Press, 1979), 18–19 and 39.

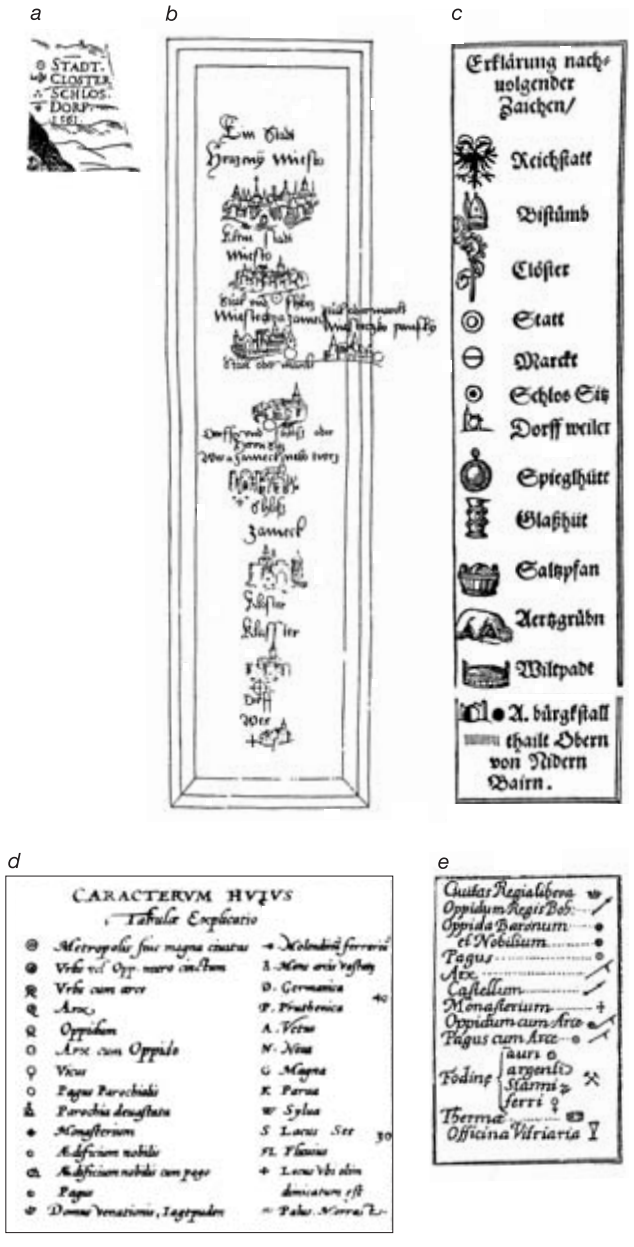


FIG. 21.3. EXPLANATION OF SIGNS ON A MAP. (*a*) Martin Helwig's inconspicuous but critical key to the four codes attached to the pictorial signs on his map of Silesia (1561). (*b*) The almost unintelligible key, in Czech and German, on the final version of Paul Fabricius's map of Moravia (1569). Fabricius used Helwig's codes, adding two of his own: the concentric rings with a location dot for the first category (fortified town) and a plain circle for the third (town with a market). (*c*) Philipp Apian's fourteen-item key on his map of Bavaria (1568). (*d*) Caspar Henneberger's explanation of the eighteen graphic and nine alphabetic codes on his map of Prussia (1584), published by Ortelius the same year. (*e*) Paulus Aretinus's coded signs on his map of Bohemia (1619).

FIG. 21.4. AN ENGRAVER'S INCONSISTENCY. Two examples of Paolo Forlani's work, both signed: top, from his map of Savoy (1562), and bottom, from his map of the Holy Land (1566).

in five different ways. Remigius Hogenberg used two styles of park signs on nine maps, and Lenaert Terwoort omitted shading the hills altogether on one of his maps, used cross-hatching on another, and vertical lines on yet another, all within about a year. Other mapmakers fared no better at the hands of their engravers. Between 1560 and 1570, the engraver Paolo Forlani signed eleven maps by various mapmakers.[34] On these maps, the hill signs are shaded on the left side on two maps and on the right side on the others; cross-hatching instead of lines is used for hill shading on two maps; the shape of the hill signs is angular, with or without sharp facets, on some maps and terraced on the others (fig. 21.4). On the majority of the maps he engraved, Forlani employed only one or two vegetation signs, including an idiosyncratic tree sign resembling gigantic grass, but on his own map of Lombardy (1561) he appears to have employed every type of vegetation sign known to him. What lay behind the different treatments is not easily explained. It could be that Forlani was prepared to take more care over a map he himself had compiled than on one for which he was merely the engraver.

34. See David Woodward, *The Maps and Prints of Paolo Forlani: A Descriptive Bibliography* (Chicago: Newberry Library, 1990).

FIG. 21.5. THE HAND OF THE ENGRAVER. The manuscript draft, dated 1602 (top left), and printed version, dated 1603 (top right), of William Smith's map of the county of Hertfordshire. Below is Smith's 1603 map of the county of Worchestershire, manuscript draft (bottom left) and printed version (bottom right).

Mapmakers, as we see from the occasional instance when a surviving manuscript draft can be compared with the printed version, were no more consistent than their engravers. William Smith's drafts are highly polished, clear, and detailed.[35] Nonetheless, his engravers preferred to work in their own style instead of tracing Smith's in every respect.[36] In the case of Smith's map of Worcestershire, for example, his rather squat, rectangular pictorial settlement signs were transformed by the engraver (thought to be Hans Woutneel) into tall, slim, rounded towers (fig. 21.5), although some of Woutneel's changes were constructive, not cosmetic, such as when he supplied missing locational dots and repositioned those wrongly placed by Smith.[37] But no engraver can be seen as responsible for the variations noted when all twelve of Smith's county maps are compared to each other. We find some maps with one class of boundary, others with two classes; some with five categories of settlement, others with six or even seven; and some on which the locational dot is supplied for all settlements, some on which it is supplied for the largest settlements only or omitted altogether.[38] Each map has a different style of border.

It may be argued that some unpredictability in the selection of map content and the rendering of map signs is understandable when the mapmaker was working on his own, but the same situation is found in the case of maps in atlases. Here, surely, it could be expected, was a context in which the atlas producer had both a mandate for and an interest in controlling the content and appearance of the maps selected for inclusion in a particular project. From Ortelius onward, however, the evidence only supports the thesis that standardization was simply not a Renaissance ideal and that modern commentators are misguided in expecting it.[39] Apart from the facts that the printed sheets fit without extra folding between the covers of a bound volume and that the language is the same throughout, neither Ortelius's maps nor the other atlas maps of the later Renaissance betray any indication of a policy of consistency. We may read, as we often do, com-

35. In a rare slip, William Smith had placed a location dot confusingly above, instead of below, a parish church sign. A number of Smith's manuscript drafts survive. There are three versions of his map of the county Palatinate of Cheshire: the small illustration (18 × 23 cm) on folio 131 of his written description of the county dated "1585 September" (BL, Harleian MS. 1046) and two drafts prepared for engraving (BL, *Maps C.2.cc.2 [12], ca. 1585, and Oxford, Bodleian Library, MS. B. Rawl. 282). There are also engraver's drafts for his maps of Staffordshire, 1599 (Oxford, Bodleian Library, [E] C.17.55 [45]), Hertfordshire, 1601 corrected to 1602 (BL, *Maps C.2.cc.2 [13]), Warwickshire, 1603 (BL, *Maps C.2.cc.2 [14]), and Worcestershire, 1602 (BL, *Maps C.2.cc.2 [15]). A map of the region around Nuremberg titled "A Breef Description of the Famous and Beautifull Cittie of Norenberg" (1594) is extant in three examples: one is in London, Lambeth Palace, MS. 508; one is in Nuremberg; and the third, a hitherto unrecorded example, was recently purchased by the BL, Add. MS. 78167. See Catherine Delano-Smith and R. J. P. Kain, *English Maps: A History* (London: British Library, 1999), 186–88.

36. For a long time, seven of Smith's county maps, printed in 1602–3, were considered anonymous; see, for instance, Edward Heawood, *English County Maps in the Collection of the Royal Geographical Society* (London: Royal Geographical Society, 1932), 4–5 and 11–13.

37. Woutneel copied Smith's geographical details faithfully, however, substituting only his own way of presenting trees. A different engraver worked on Smith's map of Hertfordshire to broadly similar effect. Smith had drawn the sign for abbeys with the gable end facing west, so that after printing each church would be correctly oriented to the east, and with a seriffed cross in the middle of the roofline. The engraver omitted the serifs and moved the cross to the gable end.

38. Monasteries have no locational dot on Smith's maps. Apart, though, from a nunnery in the city of Chester and an isolated nunnery on the Essex side of the Hertfordshire-Essex border, monasteries are shown only on the map of Surrey. Smith was inconsistent in what extras he chose to show on each map: there are beacons, watermills, and windmills on the map of Surrey, but the map of Hertfordshire has battle sites instead of windmills, for example.

39. On the tendency to apply modern values to premodern maps, see Catherine Delano-Smith, "The Grip of the Enlightenment: The Separation of Past and Present," in *Plantejaments,* 283–97.

ments to the effect that "the crowning achievement of Abraham Ortelius of Antwerp lay in his standardizing and rationalizing the published collection of maps in his *Theatrum orbis terrarum* of 1570," but whatever criteria underpin such judgments, they cannot have included an analysis of the signs or of other aspects of the map image.[40] Our finding is that Ortelius's *Theatrum* scores low on virtually every measure of homogeneity and consistency.

The first edition of the *Theatrum* (1570) contains sixty-nine maps printed on fifty-three sheets, of which eleven were excluded from further consideration.[41] No sheet is folded other than down the center, and every map is printed, alone or in multiples, on an identically sized page. The language is Latin throughout, including the book's preliminaries. Apart from these aspects, though, there is only variety. The maps are not even always quadrilateral in shape; three are oval. Two maps are presented with a *trompe l'œil* effect, as scrolls overlying another map or view. Fewer than two-thirds of the maps have north at the top; the others have south, east, or west at the top. Some maps fail to give an orientation at all; on others, words (*septentrio,* etc.) may be used, while on a few, a compass rose is provided. Coordinates for latitude and longitude are given on half the maps, those for latitude alone on four maps (in one case the climatic zones are indicated instead), and none at all on the other maps. Only ten maps lack a scale bar, but on thirteen maps the scales are given in up to four different units. Five maps have a key taken from the original source map, but on at least four maps the key present on the source map has been omitted.[42] Finally, when we look closely at the map signs, we find that they are, to all intents and purposes, identical to those on source maps that could be up to forty years old, and no attempt was made to homogenize even the type of sign used. Settlement signs, for example, are wholly pictorial on the vast majority of maps, but on the rest they are mixed abstract and pictorial, with abstract signs tending to predominate.

Ortelius's maps are thought to have been engraved by one person, Frans Hogenberg.[43] Had other engravers been involved, it still would not have been difficult for Ortelius to decide on a blueprint for the entire corpus had he so wished. Arguably he did, but only with respect to the borders, for which no fewer than twenty-five different patterns were used. In fact, Ortelius makes a point of emphasizing that he had changed nothing on the original exemplars except to make them more readable, and that nothing—"no, never so small a thing"—was omitted. Clearly Ortelius did not seek consistency. Either he wanted to retain the "flavor" of the original map, because it was quicker and cheaper to copy each sign than to recreate it, or, most likely, it simply never occurred to him or to anyone around him that signs, or anything else, should be standardized. His stated objective relates only to the convenience of creating a particular kind of physical artifact, a bound volume containing a large number of mainly regional maps.[44]

Ortelius's contemporaries and successors behaved no differently. About half of Gerard de Jode's maps have a counterpart in the *Theatrum,* having been taken directly from the original used by Ortelius or copied from Ortelius's versions, but the maps in De Jode's *Speculum* (1578) are even less consistent than those in Ortelius's *Theatrum.*[45] Latitude and longitude is sometimes given, few maps have scales, and fewer still have keys. If De Jode's maps appear orderly and legible, this is because the hill signs and tree signs of the originals have been considerably reduced in number or omitted altogether. Gerardus Mercator, who compiled and drafted all the maps in his atlas and engraved many of them himself, also copied his source maps without adjusting the signs to a style of his own.[46] The first part of his atlas to be published (*Tabulae geographicae Galliae, Belgii Inferioris et Germa-*

40. Karrow, *Mapmakers of the Sixteenth Century,* xxx.

41. The widely cited total of seventy maps (given also by Karrow, *Mapmakers of the Sixteenth Century,* 5) represents a computing error, according to Robert W. Karrow, personal communication, 2002. The *Theatrum* contains five general maps (one world map and four continental maps), six small island maps as one double-page map and two island maps as another, and fifty-seven regional maps, making a total of sixty-nine individual maps. The five general maps and six small island maps are not included in the percentage calculations.

42. One key contains seven items, another a single item; the others have either three or four items. The key has been omitted from maps derived from Fine's *Galliae* (1525), Rotenhan's map of Franconia (1533), and Deventer's maps of Brabant (1536) and Gelderland (1543), for example. In Ortelius's version (1570) of Johannes Criginger's map of Saxony of 1567, a graphic key was added to the map to replace the original descriptive key given on a separate sheet of paper. In other cases, the original author's key was altered in some way, usually minor, such as in presentation or number of items shown.

43. Karrow, *Mapmakers of the Sixteenth Century,* 5.

44. Ortelius explained that he realized that there were some who lacked the means of purchasing all available maps of their country, and others who, although "very willing to lay out the money," did not have space at home to "open and spread" large maps. These were the people he expected to appreciate the opportunity he was providing to consult a single map of their country "contain'd in one leaf"; see Abraham Ortelius, *Theatrum orbis terrarum . . . The Theatre of the Whole World* (London: Iohn Norton, 1606), dedication. Ortelius may also have been influenced by his friend Gilles (Egidius) Hooftman, an Antwerp businessman who was accustomed to using topographical maps for calculating the distance his goods had to travel and the risks they ran. Hooftman told Ortelius that he wanted a convenient way of handling maps of various sizes; see Karrow, *Mapmakers of the Sixteenth Century,* 4.

45. R. A. Skelton, "Bibliographical Note," in *Speculum orbis terrarum: Antwerpen, 1578,* by Gerard de Jode (Amsterdam: Theatrum Orbis Terrarum, 1965), V–X, esp. VIII.

46. Mercator may have had some assistance in the engraving from Frans Hogenberg and his own grandson Johannes Mercator; see R. A. Skelton, "Bibliographical Note," in *The Theatre of the Whole World: London, 1606,* by Abraham Ortelius (Amsterdam: Theatrum Orbis

niae, 1585) contains fifty-one maps. On these the sea may be stippled, pecked, *moiré,* or wave-patterned; hill signs range from small, trifaceted molehills, with slightly rounded crests or pointed crests, to large, craggy signs like those on his maps of Stiria and Switzerland; and extensive areas of upland may be indicated by either close-packed hill signs or a notional scattering of tiny hillocks, while five maps show no relief at all. Mercator's settlement signs all contain a location dot and a place-name pointer, but on some maps all the signs are pictorial, and on others pictorial signs are mixed with abstract signs; on some maps, the style of the signs is schematic, on others, naturalistic; and sometimes they are shown in profile, sometimes in perspective. While most maps distinguish two ranks of settlement, others show three ranks.

When Jodocus Hondius the Elder inherited the plates for Mercator's atlas, he was presumably at liberty to alter them prior to reprinting, but his editions of Mercator's atlas have been criticized for lacking the "homogeneity and critical effort" of Mercator's original compilations.[47] Gabriel I Tavernier was given the task of simply making a copy of each original for Maurice Bouguereau's atlas, *Le theatre francoys* (1594), so the lack of "unity" noted by Dainville is to be expected.[48] Most surprising, to the modern mind, is the fact that none of the great Dutch printing houses of the first half of the seventeenth century—those of Jodocus Hondius the Elder, Henricus Hondius, Johannes Janssonius, and the Blaeu family (Willem Jansz. and Joan)—made any attempt to streamline production by introducing the standardization we today associate with economies of scale in commercialized mass production. As already noted, however, things were very different in the Renaissance, and cost-saving took the form of employing large numbers of relatively low-paid copyists to replicate the image before them. It was not economic to train engravers to a point at which each could take responsibility for the decisions involved in transforming the signs on the original into something different for a new map. Until the end of the Renaissance, copied maps generally retained the form the original mapmaker or engraver had given them. Maps newly compiled in the final decades of the period still followed traditions that can be traced back well beyond the Middle Ages.

Semiotic inconsistency may have been the norm and conventional signs in the modern sense nonexistent on Renaissance topographical maps, but the situation was different in the case of specialist maps. On these, what we might call "customary signs" conveyed critical information in a manner conforming to established—if unrecorded—practice. Customary signs were essential to operational success. As is well known, safe navigation depended on the clear and unambiguous marking of natural hazards, and from the time of the earliest surviving charts onward, crosses have been used to warn navigators of rocks and stippling to indicate dangerous sands.[49] Beyond this basic rule, however, there appears to have been surprisingly less consistency than might be expected. One study of signs on early charts found "35 variations and embellishments" of the basic cross sign on maps before 1800, and also found that, "generally speaking, the Dutch tended to use a larger variety of rock symbols (in some works as many as eight) while the French and the English used as few as one or two types of rock symbols."[50] Despite a new tendency to indicate the meaning of such signs on Dutch charts in the first half of the sixteenth century, the signs continued to be used interchangeably and arbitrarily.[51] The variety of rock signs in Lucas Jansz. Waghenaer's supposedly influential treatise and atlas of sea charts simply "does not support the conclusion reached by Waters (1958) that *De Spieghel* influenced standardization of rock symbols on nautical charts."[52]

It is difficult to trace the history of the oral transmission of customary signs. One hint comes from Sir Humphrey Gilbert's detailed written instructions to Thomas Bavin at the end of the sixteenth century. Bavin, a surveyor appointed to accompany Gilbert on a projected expedition to North America in 1582 or 1583, was given a list of the "particuler marckes" he was to use on his charts (fig. 21.6).[53] It is unclear how Gilbert had come by his knowledge of the "marckes," and whether he was

Terrarum, 1968), V–XVIII, esp. VI, and the English-language biography of Mercator by Nicholas Crane, *Mercator: The Man Who Mapped the Planet* (London: Weidenfeld and Nicolson, 2002), 255.

47. The reproach is Skelton's in his "Bibliographical Note," in *Theatre of the Whole World,* X.

48. "The exactness with which such diverse documents were copied explains the lack of unity of the collection"; see François de Dainville, "Bibliographical Note/Note Bibliographique," in *Le théatre françoys: Tours, 1594,* by Maurice Bouguereau (Amsterdam: Theatrum Orbis Terrarum, 1966), VI–XIII, esp. VI. Bouguereau's atlas was composed of eight maps from Ortelius's *Theatrum,* four from Mercator's *Tabulae geographicae Galliae, . . .* three separate sheet maps already in circulation, and only three entirely new maps. There are thirteen different border styles.

49. The Carte Pisane, the earliest extant chart, thought to date from just before the end of the thirteenth century, has four types of cross sign for different types of rocky hazards. The Vesconte chart is the first to show sands as well as rocks. See Campbell, "Portolan Charts," 378 n. 68 and pl. 30. Nothing is said in any of the printed rutters about these signs on charts.

50. Mary G. Clawson, "The Evolution of Symbols on Nautical Charts prior to 1800" (M.A. thesis, University of Maryland, 1979), 24.

51. Clawson, "Evolution of Symbols," 25, referring to Lucas Jansz. Waghenaer, *Spieghel der zeevaerdt* (Leiden: Christoffel Plantijn, 1584–85), in English, *The Mariners Mirrour* (London, 1588); see David Watkins Waters, *The Art of Navigation in England in Elizabethan and Early Stuart Times* (London: Hollis and Carter, 1958).

52. For Dutch charts before and including Waghenaer, see Arend W. Lang, *Seekarten der Südlichen Nord- und Ostsee: Ihre Entwicklung von den Anfängen bis zum Ende des 18. Jahrhunderts* (Hamburg: Deutsches Hydrographisches Institut, 1968).

53. Gilbert's expedition to North America did not in the end take place, and no maps are known that can be associated with these

FIG. 21.6. INSTRUCTIONS TO SURVEYORS. Sir Humphrey Gilbert's instructions to Thomas Bavin, issued in anticipation of a putative reconnaissance expedition to North America in 1582 or 1583, included a list of the signs Bavin was to use on his charts. The first three signs were to be used to indicate, respectively, woods, hills, and rocks on land. The sign for rivers is not indicated, but the next two items indicate how shelves and depths in the river channels were to be given, in feet. The sign for rocks above water is missing, and that for rocks below water is a scatter of crosses. The rest of the list concerns information to be written on the map: depths in fathoms (*fa*); latitude and longitude; compass variation (*flie*), to be certified by "the Instrument of variacyon"; and declination.
Size of the original: ca. 33 × 20.8 cm. Photograph courtesy of the BL (Add. MS. 38823, fol. 2).

passing them on from another authority, whether he himself had been trained in their use and was initiating Bavin in their normal use, or even the degree to which providing such instruction was the regular practice in England among chartmakers. At the Casa de la Contratación in Seville, one of the purposes of maintaining the *padrón real* was "to ensure the standardisation of . . . knowledge [of new discoveries], so that errors and inconsistencies among charts could be eliminated," and Spanish pilots were obliged to undergo formal training before they were regarded as qualified.[54] It is hard to imagine that nothing was said in the course of that training about the signs on charts and their meaning. However, there does not seem to have been any parallel institution or system of formal apprenticeship relating to the production of printed topographical maps, and the study of map signs on the printed topographical maps of the Renaissance has to do with map "signs" and not at all with customary, still less conventional, signs.

Map Signs in the Older Literature

Given the centrality of map signs to the purpose of a map, it is remarkable that so little has been said hitherto about their history. Understandably, modern practitioners of cartography, who consider it their goal "to make effective maps," have little time to spare for research into comparative semiotics.[55] The literature on the history of map signs to date includes only two substantial studies: in 1946 a geographer, Eila M. J. Campbell, completed her university thesis titled "The History of Cartographical Symbols" (as she called them), and in 1964 the French historian François de Dainville published *Le langage des géographes*.[56] Despite Campbell's stated focus on

instructions. It has been suggested that William Borough (Burrough), the future clerk of the Navy Board, was responsible for defining the map marks; see E. G. R. Taylor, "Instructions to a Colonial Surveyor in 1582," *Mariner's Mirror* 37 (1951): 48–62. See also David B. Quinn, ed., *New American World: A Documentary History of North America to 1612,* 5 vols. (New York: Arno, 1979), 3:239–44.

54. David Turnbull, "Cartography and Science in Early Modern Europe: Mapping the Construction of Knowledge Spaces," *Imago Mundi* 48 (1996): 5–24, esp. 7–14 (quotation on p. 7); Alison Sandman, "An Apologia for the Pilots' Charts: Politics, Projections, and Pilots' Reports in Early Modern Spain," *Imago Mundi* 64 (2004): 7–22; and chapter 40 in this volume.

55. Quotation from MacEachren, *How Maps Work,* 310. Among the few cartographers to refer in passing to what is usually described as the development of a cartographic vocabulary was Erwin Raisz, in *General Cartography* (New York: McGraw-Hill, 1938). Raisz, whose opening summary of the history of maps as manifested through map signs was omitted from the second edition (1948), started from the confused premise that "to picture the important features of the Earth's surface on maps we have to conventionalize them" (p. 118). See also A. G. Hodgkiss, *Understanding Maps: A Systematic History of Their Use and Development* (Folkestone: Dawson, 1981), 39–49. Like Mark Monmonier's *How to Lie with Maps* (Chicago: University of Chicago Press, 1991), Wood's discussion of early map signs draws indifferently on different periods, cultures, contexts, and genres for the examples on which his generalizations are based; see Denis Wood with John Fels, *The Power of Maps* (New York: Guilford, 1992), 143–54. Wood and Fels's Piagetian view of cognitive development led them to seek parallels between signs on indigenous maps and those drawn by modern North American preschool and school children; see Denis Wood and John Fels, "Designs on Signs: Myth and Meaning in Maps," *Cartographica* 23, no. 3 (1986): 54–103.

56. Eila M. J. Campbell, "The History of Cartographical Symbols, with Special Reference to Those Employed on Maps of a Scale of Less than 1:50,000" (M.A. thesis, University of London, 1946), and Dainville, *Le langage des géographes*. I am grateful to the late Professor Peter Campbell for making his late sister's thesis available to me. Campbell was limited to some degree by wartime and postwar restrictions on the availability of primary sources. She published three short papers relating to her thesis: "The Development of the Characteristic Sheet, 1533–1822," in *Proceedings, Eighth General Assembly and Seventeenth International Congress: International Geographical Union*

eighteenth-century topographical maps "of a scale of less than 1:50,000," in fact the maps she treated vary widely, and it is regrettable that her often perceptive remarks failed to gain the wider attention they merited at the time. Dainville's strikingly original work has also had no methodological impact. This may be explained by the fact that Dainville's interests lay not in the history of maps per se but in maps as instruments in the service of history. *Le langage des géographes* was formulated as a guide for historians and geographers who needed a "historical glossary of geographical terms," not as a systematic exposition of map signs between 1500 and 1800.[57] Reviewed on Dainville's terms, the glossary is immensely useful, not least for the way quotations from contemporary treatises are married with reproductions of the relevant signs. The breadth of maps drawn on by Dainville was wide and included English, German, and Italian as well as French topographical maps, but his trawls were unsystematic and his coverage of the sixteenth and early seventeenth centuries relatively poor, and he often failed to provide adequate identification of the examples reproduced. As a study of map signs, then, Dainville's book is of limited use. Nonetheless, apart from the chapter about signs on the French ecclesiastical maps in an earlier book, *Le langage des géographes* remains the only published work bearing more or less directly on the history of signs on early modern European maps.[58]

A weakness (as it is now seen) of twentieth-century writing on early map signs is the underlying positivism and the tendency to rewrite the history of such signs in evolutionary terms. The history of map signs is almost invariably presented as a progressive sequence, advancing from simple to sophisticated, from crude to improved, and from pictorial to conventional. Dainville himself concluded that there was "a clear-cut progress in all countries, a progress that is reflected in attempts at precision in the [cartographic] vocabulary."[59] Fordham employed frankly Darwinian terminology when he asserted that "there has been a gradual elimination of unsuitable signs, and the 'survival of the fittest' has produced a stereotyped uniformity—very essential in cartography, now an exact and highly-developed science."[60] Conflating the history of map signs with map types, Harvey tried to fit the whole of map history into a single symbol-picture-survey sequence.[61] Imhof addressed the representation of relief on all maps, irrespective of genre, with a single developmental sequence in mind.[62] Yet the maps themselves yield no evidence to support a linear, still less a progressive, model for the history of map signs. Both abstract signs and pictorial signs have been used, as far as one can tell, since earliest times, unchanged in their key attributes.[63]

Other unsubstantiated ideas about the nature of map signs are proving no less easy to dislodge. There is, for ex-

(Washington, D.C.: United States National Committee of the International Geographical Union, 1952), 426–30; "Lehmann's Contribution to the Cartographical Alphabet"; and "The Beginnings of the Characteristic Sheet to English Maps," *Geographical Journal* 128 (1962): 411–15.

Some histories of cartography omit all mention of map signs, such as G. R. Crone, *Maps and Their Makers: An Introduction to the History of Cartography* (London: Hutchinson's University Library, 1953). Others include a perfunctory comment, for example: Herbert George Fordham, *Maps: Their History, Characteristics and Uses* (Cambridge: Cambridge University Press, 1921), 46–51; R. A. Skelton, "Decoration and Design in Maps before 1700," *Graphis* 7 (1951): 400–413 (in English, Dutch, and French); idem, *Decorative Printed Maps,* 10–13; and Lloyd Arnold Brown, *The Story of Maps* (1949; reprinted New York: Dover Publications, 1979), 175–76 and 284–85. Anna-Dorothee von den Brincken, in "Die Ausbildung konventioneller Zeichen und Farbgebungen in der Universalkartographie des Mittelalters," *Archiv für Diplomatik* 16 (1970): 325–49, concentrates on the significance of color on medieval *mappaemundi.*

A few papers, usually short, deal with a selected category of signs, including examples from the Renaissance in passing, or concentrate on signs on a single type of map. Notable examples of this sort of treatment include Lynam, "Ornament, Writing and Symbols"; C. Koeman, "Die Darstellungsmethoden von Bauten auf alten Karten," in *Land-und Seekarten im Mittelalter und in der frühen Neuzeit,* ed. C. Koeman (Munich: Kraus International, 1980), 147–92; and Eduard Imhof, *Cartographic Relief Presentation,* ed. Harry Steward (Berlin: De Gruyter, 1982), 1–13. For a rare example of a study of the signs used by one particular mapmaker in the Renaissance, see the essays in Ian Campbell Cunningham, ed., *The Nation Survey'd: Essays on Late Sixteenth-Century Scotland as Depicted by Timothy Pont* (East Linton: Tuckwell Press, 2001).

Emanuela Casti's recent study *Reality as Representation: The Semiotics of Cartography and the Generation of Meaning,* trans. Jeremy Scott (Bergamo: Bergamo University Press, 2000), concentrates almost entirely on a postmodernist interpretation of selected sixteenth-century maps. Harley places "individual signs" on the same level of the iconographical analysis of maps as Erwin Panofsky's "primary or natural subject matter consisting of individual artistic motifs," but nowhere says anything much about them as map marks, concentrating instead on their symbolic interpretation; see Harley, "Texts and Contexts," 47. Harley's iconographical approach was taken from Erwin Panofsky, *Meaning in the Visual Arts: Papers in and on Art History* (Garden City, N.Y.: Doubleday, 1955).

57. Dainville, *Langage des géographes,* vii.

58. François de Dainville, *Cartes anciennes de l'Église de France: Historique, répertoire, guide d'usage* (Paris: J. Vrin, 1956), esp. 200–210. As in *Langage des géographes,* the emphasis is heavily on seventeenth-century and later maps.

59. Dainville, *Langage des géographes,* 325.

60. Fordham, *Maps,* 50.

61. P. D. A. Harvey, *The History of Topographical Maps: Symbols, Pictures and Surveys* (London: Thames and Hudson, 1980), esp. 9–10 and 14.

62. "This is as far as graphic forms had developed by the end of the 15th century"; see Imhof, *Cartographic Relief Presentation,* 3.

63. Campbell notes: "When the sequence of symbols employed . . . is studied it is found that no simple evolution from the primitive to the advanced—from the realistic to the conventional—has occurred"; see Campbell, "History of Cartographical Symbols," 2. Dainville's ranks of signs illustrated in *Langage des géographes* are packed with post-Renaissance examples, but for all the variety, it is impossible to see any break between 1500 and 1800 in his material. For prehistoric map signs, see Catherine Delano-Smith, "Cartography in the Prehistoric Period in the Old World: Europe, the Middle East, and North Africa," in *HC* 1:54–101, esp. 59–60.

ample, the notion of the perfect or ideal sign. This was said to be "obviously a picture which reproduces our visual image," and was used to explain why "pictorial symbols have always been, and still are, used by cartographers."[64] A related idea is that of a "natural" sign whose meaning is supposed to be understood intuitively, as opposed to the conventional (and the customary) sign with its implication of formal induction or instruction. Thus, for Raisz, "a good symbol is one which can be recognized without a legend."[65] Raisz's precept would seem to privilege pictorial signs. Brown at first concurred, describing the pictorial sign as "entirely independent of speech," but then reminded himself that "a symbol cannot represent its meaning to someone who has no experience with the thing signified."[66] Robinson likewise cautioned that "legends are naturally indispensable to most maps, for they provide the explanation of the various symbols used."[67] Another notion underpinning traditional thinking about maps in general, which affects thinking about signs in particular, is that of objectivity. Now refuted on all sides, even in science, the Enlightenment belief in absolute measurement and neutral observation has been challenged by postmodernists, who note that, far from being a neutral mark, a map sign, in the same way as a map itself, can in fact actively modify our knowledge of reality.[68]

Analyzing Renaissance Printed Topographical Maps

The signs analyzed and discussed in this chapter come almost exclusively from printed topographical maps produced between about 1470 and about 1640. There are several reasons for the focus on this particular type of map. First, preliminary study showed that the printed maps of the Renaissance used essentially the same signs as their manuscript predecessors. Second, the printed general reference map dominated sixteenth-century and subsequent map output to a degree unmatched by any other map genre at any time. Third, as a quintessential Renaissance creation, the general printed topographical map encapsulated the practices, values, and ethos of the period. Maps of the world are too small in scale to carry more than a limited range and amount of geographical information or to allow any but the most perfunctory signs to be deployed. In contrast, a map of an individual region, county, or province gives the mapmaker plenty of scope to portray the landscape in question through an unlimited variety of signs.

The first task in the present study was to make a record of the signs found on a sample of early modern printed regional maps and to acquire photographs for the figures that illustrate the analysis that follows.[69] The aim was to create a homogeneous database of signs from a single genre of maps in their original state. Where the first state of a map was no longer extant, usually because of loss, the second state was used instead, provided there was good reason to accept that it represented the original state and that whatever changes had been made to block or plate did not affect the signs. Copies of originals were usually excluded, except in the case of atlas maps, until the 1630s and 1640s, for which period it is difficult to find a completely new printed regional map or one not produced for an atlas of one of the Dutch commercial printing houses. To minimize skewing the sample by overrepresentation of a single mapmaker's work, no attempt was made to include every map made by exceptionally prolific mapmakers such as Giacomo Gastaldi (Castaldi, Castaldo, Gastaldo) or even Christopher Saxton. Individual atlases were analyzed separately and are represented in the general database by only a small selection of their maps. In cases of copies, the original map and the subsequent sequence of copying is detailed in appendix 21.1 (and in abbreviated form in the figures). Every attempt was made to ensure a reasonable spread in terms of geography, chronology, and medium. Thus, the preponderance of woodcut maps in the first half of the period (ca. 1470–ca. 1560) and of copperplate maps in the second half can be taken as a fair reflection of the situation, not a biased sample. The recording of the signs was carried

64. Skelton, *Decorative Printed Maps,* 10. Skelton does not identify the source of his comment, which is Raisz, *General Cartography,* 118.

65. See Raisz, *General Cartography,* 118, where the phrase is italicized for emphasis.

66. Roger Brown, *Words and Things* (Glencoe, Ill.: Free Press, 1958), 58–59. Brown uses the word "pictogram."

67. Arthur Howard Robinson, *Elements of Cartography,* 2d ed. (New York: John Wiley and Sons, 1960), 238. The phrase has been updated slightly for the sixth edition, extensively rewritten, but the sentiment is the same: "Legends or keys are indispensable to most maps, since they explain the symbols, information sources, and data manipulation used in making the map"; see Robinson et al., *Elements of Cartography,* 336.

68. The essential subjectivity of modern and early alike was one of Brian Harley's major preoccupations; see Harley's *New Nature of Maps.* In connection with signs, see, in particular, J. B. Harley, "Maps, Knowledge, and Power," in *The Iconography of Landscape: Essays on the Symbolic Representation, Design and Use of Past Environments,* ed. Denis E. Cosgrove and Stephen Daniels (Cambridge: Cambridge University Press, 1988), 277–312; reprinted in Harley's *The New Nature of Maps: Essays in the History of Cartography,* ed. Paul Laxton (Baltimore: Johns Hopkins University Press, 2001), 51–81, esp. 69–70. The creative role of map signs has also been noted by writers as diverse as Richard Helgerson, in *Forms of Nationhood: The Elizabethan Writing of England* (Chicago: University of Chicago Press, 1992), 147, and MacEachren, in *How Maps Work,* v.

69. All recording was done, mostly on paper, in the second half of the 1980s, when image scanning was not generally available. The starting point was Roberto Almagià, *Monumenta cartographica Vaticana,* 4 vols. (Vatican City: Biblioteca Apostolica Vaticana, 1944–55), vol. 2. I am indebted to Richard Oliver for his help in the task of compiling record sheets and to the British Academy for financing the cost of photography.

out over a number of years, and the 242 maps listed in appendix 21.1 represent only a portion of all the printed topographical maps studied for this chapter.

The second task was to consider what features the signs represent: the map's content, in other words. A three-part classification of the geographical features represented on the maps in question was found to offer a useful framework for an analysis of map content, namely "essentials," "details," and "extras." Essential geographical information is that which defines the region's topography at the most basic level: its coastline (where relevant), lakes and rivers, vegetation, political boundaries, and settlements. The second category qualifies or provides details of these essential features. Thus, estuarine waters may be distinguished from those of the open sea, and sandy and dunal coasts differentiated from cliffed coasts, hills and plateaus from mountains, marsh from forest, internal boundaries from external boundaries, and nucleated settlements from isolated settlements, for example. The third category contains extra, in the sense of wholly optional, features.[70] Examples of such extras found on Renaissance maps include aspects of the physical environment, such as the extent of regularly frozen sea, the direction of river flow and seasonal or subterranean flow, and the location of recently drowned land, but the vast majority of these additional features are economic (e.g., mineral resources, industrial activities, land use), historical, or antiquarian. A simple list of the total geographical content of Renaissance printed maps gives the impression that many more features in all categories were being shown at the end of the period than at the beginning. By 1640, over seventy separate geographical features had been shown on one map or another.[71] This total compares with the fourteen or so features found on the maps in the manuscript and early printed editions of Claudius Ptolemy's *Geography*. It is important to bear in mind that the final total is an aggregate. No single map printed during the Renaissance carried even a substantial proportion of the full range of features represented at some time between 1470 and 1640 and described in this chapter. The vast majority of "details" and "extras" are found on no more than a handful of Renaissance printed topographical maps.

The third stage of research into Renaissance map signs brought us to the signs themselves and to the manner in which Renaissance map content was represented. From the start, though, it was important to define the visual characteristics of a map sign in order to be able to make comparisons. Three key visual attributes lie at the core of the present analysis: the composition of a sign, its perspective, and its semiotic style. Stripped to essentials, a map sign is an assemblage of lines or dots, and its composition is the way these several lines or dots are arranged or bent to form, for example, a loop or circle. Since ancient times, the two main compositional forms of all graphic signs have been pictorial and nonpictorial. Nonpictorial map signs comprise geometric figures—triangles, squares, circles, stars—and abstract or special marks, such as those used in chemistry. Geometric shapes have been used as map signs from the earliest times, together with pictorial signs.[72] As a rule, nonpictorial signs have always been outnumbered by pictorial signs.[73] The relative popularity of the two types of sign, however, may sometimes shift. Thus we find that while the settlement signs on the maps in Byzantine codices of Ptolemy's *Geography* are invariably pictorial, Latin copyists of those maps substituted nonpictorial signs. This means that maps in the earliest printed editions of the *Geography* with nonpictorial settlement signs were sustaining an alternative practice, not introducing a novelty. Pictorial signs vary considerably in their composition. A complex place-sign—indicating a capital city, for example—may be composed of a score of separate lines, a fact of which the blockcutter or engraver would have been all too aware as he worked. The overall dimensions of all signs,

70. These optional features are called "adventitious's" in J. H. Andrews, "Baptista Boazio's Map of Ireland," *Long Room (Bulletin of the Friends of the Library of Trinity College, Dublin)* 1 (1970): 29–36. Andrews observed that "from the 16th century onwards this kind of information steadily decreases, without ever quite disappearing: even the Ordnance Survey marks the birthplace of Oliver Goldsmith" (informal lecture notes on the history of cartography, no. 5, ca. 1976). The note in question appeared at Pallas, County Longford, on sheet 98 of the one-inch Ordnance Survey map of 1857, despite the fact that Goldsmith was probably born not at his father's home, but at his grandfather's at Elphin, Roscommon.

71. The aggregate features shown on maps produced over the whole of the Renaissance pale in significance when compared to the total of 1148 objects said to have been "delineated" on English topographical maps in 1885; see George M. Wheeler, *Report upon the Third International Geographical Congress and Exhibition at Venice, Italy, 1881* (Washington, D.C.: U.S. Government Printing Office, 1885), 85–145. Wheeler's categories include "natural features" (140 items), "commerce and means of communication (natural or improved)" (331 items), "agriculture" (71 items), "manufacturing" (65 items), "mining" (18 items), "special military purposes" (65 items), "purely technical" (53 items), and "miscellaneous" (142 items). Technical items, such as scales, coordinates, compass roses, and other indicators of orientation, are omitted from our own count, but the rest of the 1885 content can be reclassified as conveying "basic" geographical information (20 percent), "elaborated" information (57 percent), and "adventitious" information (23 percent).

72. Delano-Smith, "Cartography in the Prehistoric Period."

73. Matthew Paris's itinerary map of the 1250s is entirely pictorial, except for one particular sign, the meaning of which is explained in the adjacent text: "At this sign ⊜ above, where the ship is painted, at this sign is the route to Acre in Apulia. That is, as far as Otranto which is the city in Apulia on the Sea of Venice which is closest to Acre." Quoted in Suzanne Lewis, *The Art of Matthew Paris in the* Chronica Majora (Berkeley: University of California Press in collaboration with Corpus Christi College, Cambridge, 1987), 325, translated from the manuscript at Cambridge, Corpus Christi College, MS. 26, fol. iii; the wording on the manuscript BL, Royal MS. 14.C.VII, fol. 4, is only slightly different, and the sign is identical.

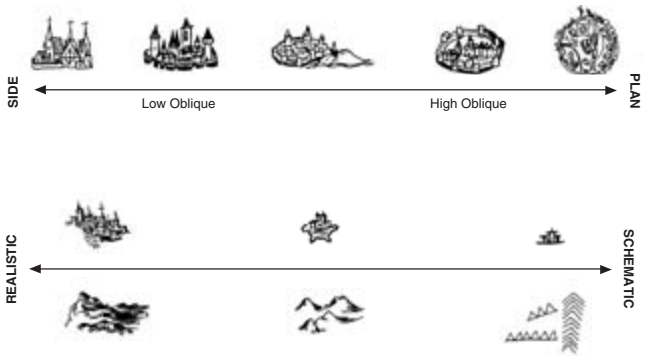


FIG. 21.7. PERSPECTIVE AND STYLE IN PICTORIAL SIGNS. Map signs may be presented (top row) as if viewed from the side at ground level (profile), as if viewed from an elevated vantage point (low or high oblique), or as if viewed from above (plan). Landscape features may be represented (bottom row) realistically (with some verisimilitude), naturalistically, or schematically.

both nonpictorial and pictorial, can also be varied to create a range of sizes of any one sign; the limiting factor is the problem of ensuring that the different sizes are readily distinguishable from one another (as is far from always the case).

The second attribute of a (pictorial) sign is the perspective it represents (fig. 21.7, top row). Like the medieval artist before him, the early modern mapmaker had to decide the angle from which each geographical feature was to be portrayed—whether it was to be shown as if viewed from a horizontal, oblique, or vertical position. All three perspectives are found on Renaissance maps.[74] Both physical and human features can be depicted from different viewpoints, and the intended angle is usually obvious. Occasionally, though, as where a pictorial sign has been highly stylized, it may be difficult to identify the intended perspective, and to understand the sign, unless the feature is labeled on the map or explained in a key.[75]

Semiotic style, the third attribute, also applies to pictorial rather than to abstract signs. In the context of map signs, semiotic style refers to something much more fundamental than the artistry of the twirls and swirls of the lines composing the sign or the color used to fill it. Semiotic style concerns the degree of generalization of the lines composing the sign. A realistic sign attempts to mimic what is actually seen in the landscape, whereas a stylized or schematic sign is a visually simplified sign, where the number of lines composing the sign have been reduced to the bare essence (see fig. 21.7, bottom).[76] The perennial confusion of semiotic style with artistic style may account for the idea that copperplate engraving represented an advance in the history of mapmaking. On closer inspection, the often-cited "delicate artistry" of some copperplate maps proves to relate only to the aesthetic of the whole map—the map as print—not to cartographic fundamentals such as the composition or perspective of the signs on the map.[77]

The range of pictorial signs available to the Renaissance mapmaker or engraver was almost limitless. In addition to the various combinations of composition, perspective, style, and size, a cipher or code (Dainville's *signe annexe*) was sometimes added to settlement signs.[78] The range of options, and the degree to which each Renaissance mapmaker appears to have followed his own preferences, makes it unrealistic to attempt to define types of map signs in other than the most fundamental of terms, as here.

Signs on Printed Topographical Maps

The order in which the signs are presented here does not follow modern cartographic practice, but rather is an echo of the Ptolemaic geography that would have been familiar in the Renaissance. Thus, after signs for natural features, we consider those for boundaries and territories before turning to signs for settlements. At the same time, the modern geographer's distinction between physical and human is respected, so instead of discussing the signs for all water features together, we discuss the signs for

74. Skelton, in *Decorative Printed Maps,* 11, is incorrect in stating that "the history of the symbols used by map-makers shows a gradual trend towards the vertical viewpoint."

75. A case in point is the E-shaped sign used by Jonas Scultetus (Glatz, 1626) for logging weirs; see figure 21.49.

76. Robinson and Petchenik suggest the term "mimetic" for such highly stylized representation; see Robinson and Petchenik, *Nature of Maps,* 61–67. Casti, in *Reality as Representation,* 51–53, esp. 52 (fig. 3), attempts to differentiate between the "destruction of complexity" and the "neutralization of complexity" in the process of selection. Neither offers a clear definition of a map sign's style, nor does Jacques Bertin, *Semiology of Graphics: Diagrams, Networks, Maps,* trans. William J. Berg (Madison: University of Wisconsin Press, 1983). See, though, Catherine Delano-Smith, "Smoothed Lines and Empty Spaces: The Changing Face of the Exegetical Map before 1600," in *Combler les blancs de la carte: Modalités et enjeux de la construction des savoirs géographiques (XVI^e–XX^e siècles),* ed. Jean-François Chauvard and Odile Georg, under the direction of Isabelle Laboulais-Lesage (Strasbourg: Presses Universitaires de Strasbourg, 2004), 17–34.

77. It is sometimes said that the finer style of an engraved map made room on the plate for an increase in the amount of geographical information shown, but as already noted, the present analysis shows that later Renaissance copperplate maps tended to carry less information, not more. It is also generally assumed that stylistic neatness reflects precision in other respects. This may very well not be the case, as Wright pointed out in his remark that "the trim, precise, and clean-cut appearance that a well drawn map presents lends it an air of scientific authenticity that may or may not be deserved"; see John Kirtland Wright, "Map Makers are Human: Comments on the Subjective in Maps," *Geographical Review* 32 (1942): 527–44, esp. 527. Taylor, and later Campbell, also noted that for all the clinical neatness of some later sixteenth- and seventeenth-century maps, the representation of relief was "almost meaningless"; see E. G. R. Taylor, "A Regional Map of the Early XVIth Century," *Geographical Journal* 71 (1928): 474–79, esp. 474, and Campbell, "History of Cartographical Symbols," 139.

78. Dainville, *Langage des géographes,* 222.

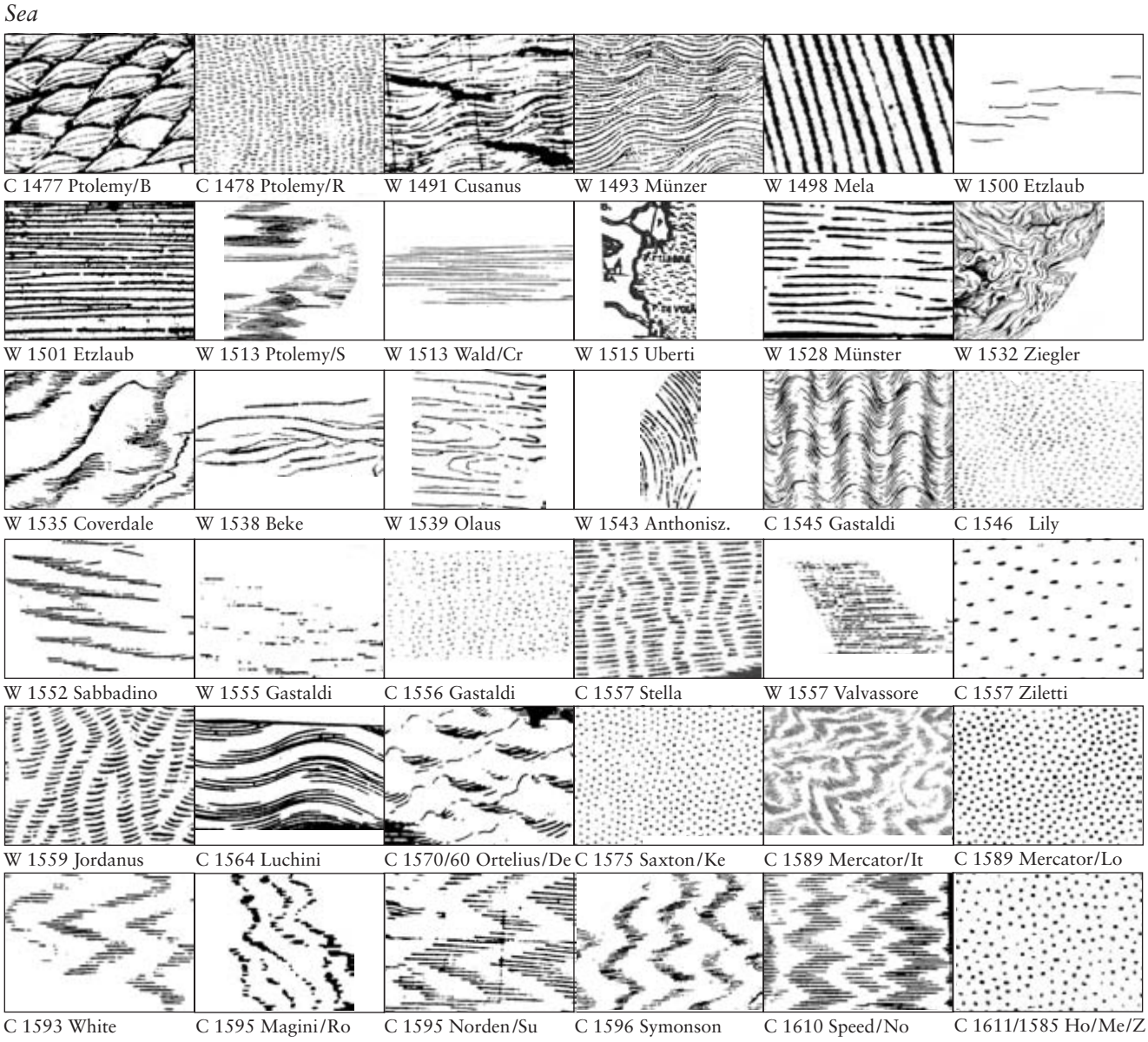


FIG. 21.8. SEA SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

features associated with the human use of water in the context of economic geography, and leave signs for the historical elements of the landscape to the end. The dates of the maps cited in the text are, as far as possible, those of the first printing of each map. Not all the maps cited in the text or listed in the appendix are illustrated in the figures. All, however, are identified in appendix 21.1 with the same abbreviations as those used in the figures.

MARINE SIGNS

Sea Signs

Generally speaking, the empty expanses of seas were filled with wave patterns. Sometimes there are vignettes of ships, fish, and sea monsters. Toward the end of the period, commercial atlas publishers economized by leaving the seas unshaded and undecorated. On colored maps, the hue may have reflected the sea at a particular season.[79] Some of the many different ways open sea was represented on maps are reproduced in figure 21.8, from which it can be seen that both dense and sparse forms of representation are as likely to be found on late Renaissance maps as on early ones.[80] The main types of signs involve

79. The colors used were typically blues, bright greens, or, as on Andreas Walsperger's world map of 1448, *viridis* for the sea in summer, and grays, dull greens, and yellows in winter. For a selection of colored seas on manuscript maps, see Dainville, *Langage des géographes,* 100.

80. Stylistic variations make it difficult to be more precise.

Coastlines

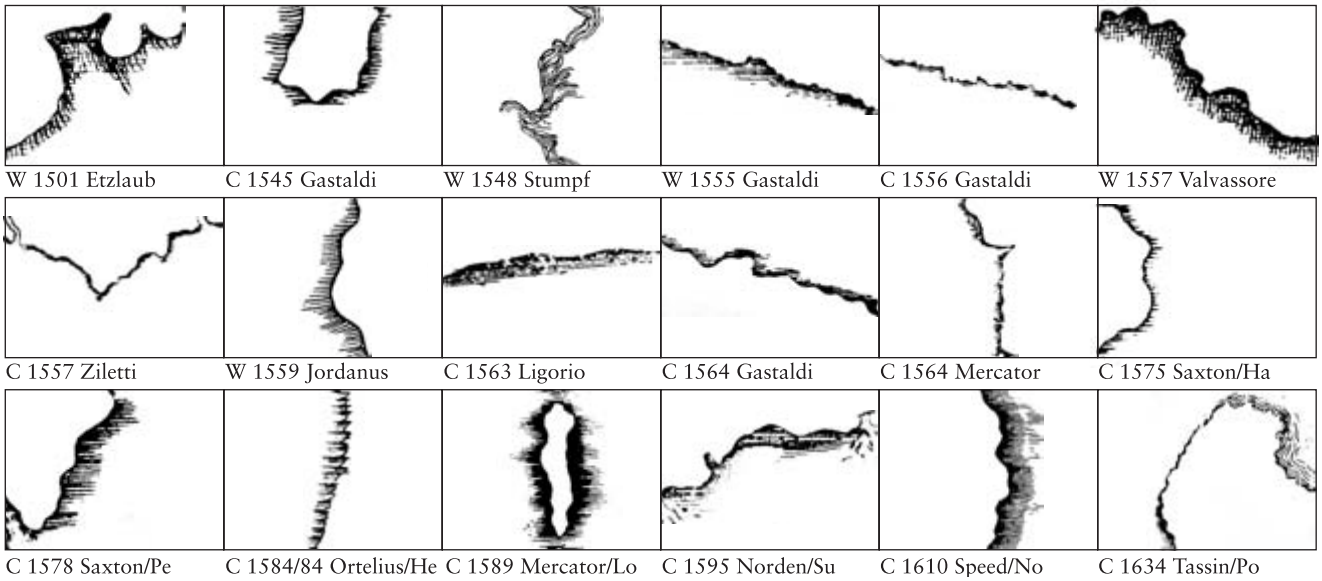


FIG. 21.9. COASTLINE SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

lines (either broken or continuous) and points (stippling). Either type of sign could be deployed mimetically. Evenly applied stippling and close-set discontinuous lines evoke a relatively calm sea, its surface broken only by the lightest of winds, but some mapmakers (or their engravers) chose to angle shorter lines into waves or twist longer lines into dramatic sweeps and curls, as if portraying the roughest of seas. Freehand stippling is characterized by unevenness in the size, shape, and distribution of the points. Occasionally, though, the stipples are aligned as if a ruler had been used as a guide.[81] Short lines were sometimes arranged, by Dutch engravers especially, into zigzag or *moiré* patterns. Other sea signs are idiosyncratic, such as the bold crimping on Giacomo Gastaldi's map of Sicily (1545), or flamboyant, such as the scrolls on Jacob Ziegler's maps of the Holy Land (1532).

Signs for Coastlines and Cliffs

Mapmakers usually marked the seaward side of a line dividing land from water by some form of linear coastal hatching, and after the 1570s almost everyone did (fig. 21.9). Densely packed short, straight lines were engraved at right angles to the line of the coast. On some maps, the lines remain horizontal even where the coast changes direction. The length of the lines forming the hatching varies considerably. On some maps, the long and short lines, or lines of different thickness, form a regular pattern. Occasionally, the hatching cuts across horizontal lines used for shading the sea, producing patches of cross-hatching.[82] Waterlines, lines parallel to the coast emphasizing the shoreline, are not found on Renaissance maps; Lubin reported that engravers disliked the task of drawing them.[83] Cliffs were only sometimes shown, inevitably pictorially, either early or late in the period (fig. 21.10). On the maps for Ptolemy's *Geography,* promontories are clearly marked, either by linear shading or by showing a mountain range projecting into the sea, but on later maps the point in the coastline is merely named.

Cliffs

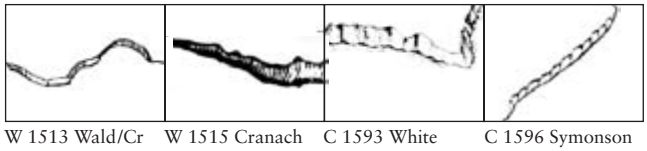


FIG. 21.10. CLIFF SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

81. Some engravers were more systematic than others in their use of the burin to create points for stippling. Two engravers appear to have been responsible for stippling the sea on Christopher Saxton's map of Dorset (1575). The one working on the right half of the map produced points in well-spaced regular lines, but his colleague's work on the other half of the map is much less orderly, and his lines are close-packed. Their work joins just west of Portland Isle.

82. The three maps on which cross-hatching along the coast has been noted are all woodcuts: Etzlaub's *Lantstrassen,* 1501; Lazarus's map of Hungary, 1528; and Valvassore's map of Friuli, 1557. Alfred W. Pollard, in *Fine Books* (New York: Cooper Square Publishers, 1964), 115, suggests that the first use of cross-hatching was for the woodcut illustrations in Bernhard von Breydenbach's *Peregrinatio in Terram Sanctam* (Mainz, 1486).

83. "There are very few engravers indeed, who would take the trouble I have taken in engraving some of my maps, to outline the land with wavy lines that follow systematically the shape of the land; the thickest line being that which is closest to the land, the others getting proportionally thinner further out. This manner of engraving is the best for

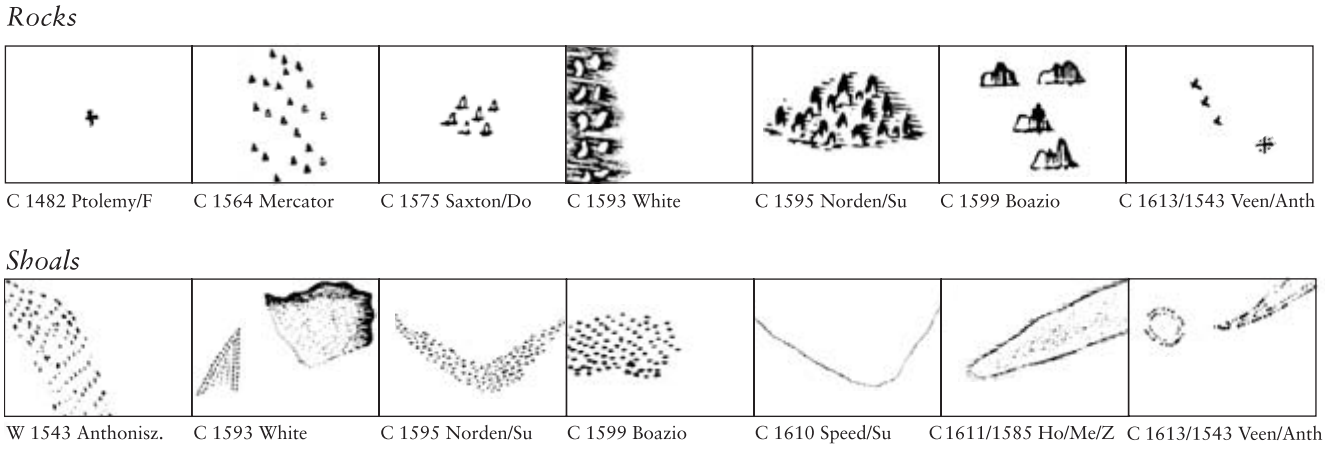


FIG. 21.11. ROCK AND SHOAL SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

Signs for Rocks, Shoals, Estuaries, and Other Marine Features

Certain marine features are clearly visible from the land, and it may have been for this reason that they also appear on some printed topographical maps. In other cases, they were probably copied from a chart used as a source or—as in the case of Cornelis Anthonisz., a chartmaker himself—added out of habit (*Caerte van Oostlandt,* 1543). Figure 21.11 shows how the highly stylized signs for rocks taken from marine charts were gradually replaced by pictorial signs on maps made for general use.[84] On Baptista Boazio's map of Ireland (1599), for example, the rocks are boldly drawn in naturalistic style. Sands and shoals tended to be shown on maps, as on charts, by fine stippling in imitation of the texture of the natural feature.

By the middle of the sixteenth century, the increased frequency and severity of storms and tidal surges associated with the onset of the Little Ice Age, coupled with intensification of land use and deforestation in the higher reaches of river basins, was causing extensive and increasingly frequent flooding, expansion of marsh, and accumulation of sands and silts in harbors and estuaries, especially on low-lying coasts all around Europe.[85] Mapmakers were aware of these changes, and many marked them on their maps. Jacob van Deventer identified land (and villages) in Zeeland submerged in the Saint Felix Day surge of 1530 (1560); Anthonisz. indicated what appears to be a complex pattern of silt and sand at the mouth of the Weser River (1543); and Baptista Boazio (1599) gave names to spits threatening to close estuaries in southern Ireland.[86] In southern France, Pierre-Jean Bompar (1591) portrayed the huge amounts of silt being discharged into the Gulf of Lyons by the Rhône's tributaries.[87]

The dangerous currents of major estuaries had long been shown by the continuation of river lines beyond the coastline and out to sea (see fig. 21.12). More unusually,

representing the sea. Engravers excuse themselves from doing this, on the grounds that the work is too long and too difficult"; see Lubin, *Mercure geographique,* 248, also referred to by Dainville in *Langage des géographes,* 99. Drawing lines parallel to the coast became standard practice by the early nineteenth century; see Lynam, "Ornament, Writing and Symbols," 326.

84. Cornelis Anthonisz. explained on the map that he used points "diligently" to mark dangerous muddy places, crosses to indicate offshore rocks; see the reproduction in Lang, *Seekarten der Südlichen Nord- und Ostsee,* pl. I. Anthonisz. refered to his map as "chartam hanc regionum orientalium," and some map historians have assumed a sea chart was intended, for example, Johannes Keuning, in "Cornelis Anthonisz.," *Imago Mundi* 7 (1950): 51–65, esp. 52. However, the map is obviously a topographical map of Denmark and lands east of the North Sea and was used as such by Ortelius for the *Theatrum* (1570).

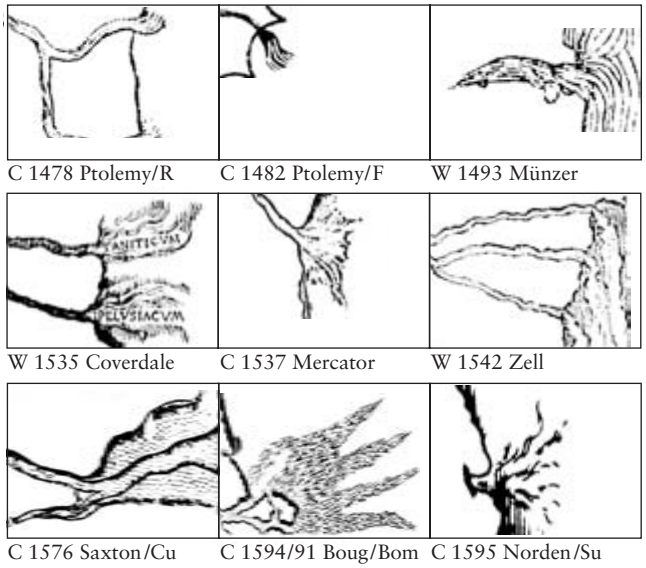
Martin Waldseemüller had placed a cross instead of points over sandy shoals on his map of the world (1507), possibly out of superstitious fear, possibly simply as a general warning of danger. In 1525 Lorenz Fries placed crosses on his copy of Waldseemüller's map of Europe (1511) so far away from the shore of Africa that one modern researcher wondered if Fries knew what they meant; see Hildegard Binder Johnson, *Carta marina: World Geography in Strassburg, 1525* (Minneapolis: University of Minnesota Press, 1963), 70. Pietro Coppo reversed the signs for rock and sands on his little map of the British Isles (1524–26), on which the sands of the Dogger bank and other North Sea shoals are marked with crosses. Yet Adriaen Veen added another sign (a cross with a dot in each angle, for permanently submerged hazards, on his reduced copy of Anthonisz.'s map (*Oostlands,* 1613).

85. On the changing climatic conditions during the Renaissance, see Jean M. Grove, *The Little Ice Age* (London: Methuen, 1988), and H. H. Lamb, *Climate: Present, Past and Future,* 2 vols. (London: Methuen, 1972–77), 2:423–73.

86. On Michele Tramezzino's copy (1555) of Mercator's map of Flanders, the whole area is labeled "submersa." Despite a second major flood forty years later, the gradual reemergence of Borssele was recorded on later versions of Jacob van Deventer's map of Brabant and Gelderland (Ortelius, 1570; Mercator-Hondius, 1611), although south of the Honte River much of the flooded area remained under water. See Audrey M. Lambert, *The Making of the Dutch Landscape: An Historical Geography of the Netherlands,* 2d ed. (London: Academic Press, 1985), 113 and 190–91.

87. Since the mid-1560s, Provence had been suffering from a marked deterioration of climatic conditions. Accelerated erosion inland led to

Estuaries



Other Marine Features

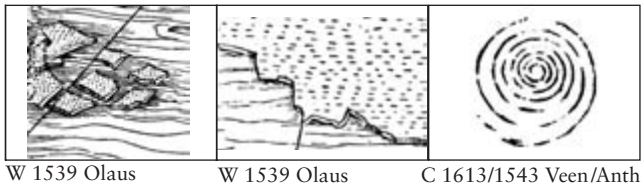


FIG. 21.12. SIGNS FOR ESTUARIES AND OTHER MARINE FEATURES. See appendix 21.1 for details of the maps from which the signs are taken.

Olaus Magnus (1539) depicted the icebound Baltic; in a bad winter, that sea could freeze solid from coast to coast.[88] In his book, Olaus reminded his readers that on his map, "or delineation of the northern regions," he had indicated the "great chasm, or whirlpool" that lay off the Norwegian coast between the islands of Röst and Lofoten, which was reputedly more dangerous than the one in the Straits of Messina, associated since antiquity with Scylla and Charybdis.[89]

HYDROLOGY SIGNS

Signs for Inland Lakes

From about the mid-sixteenth century, lakes were generally marked in the same way as the seas (fig. 21.13), especially on copperplate maps where stippled lakes matched a stippled sea. Earlier, they were often treated differently, usually with horizontal lines drawn or ruled from shore to shore.[90] Apian's practice of shading lakes differently according to size (map of Bavaria, 1568) was later advocated by Lubin, but not necessarily followed in the interim.[91] Few mapmakers attempted to differentiate open sea from coastal lagoon (brackish water) or coastal lagoon from inland (freshwater) lake. The singling out of artificial lakes (those created by dams for industrial use) was exceptional, and was usually betrayed by the straight line of the dam at one end.[92] Occasionally, the banks of a lake are indicated.[93]

Signs for Rivers

Rivers are represented on early modern printed topographical maps as a single, normally continuous, line, perhaps of variable thickness, or as a double line (fig. 21.14). The second line may remain roughly parallel to the full length of the course or taper into a single line in the higher reaches. On many of the earliest printed maps, the source of each river—a spring, according to classical mythology—may be prominently marked with a circular *orcinolo* (as on medieval maps), a practice that may

flooding downstream and, in 1587, a permanent change to the course of the Rhône in its lower reaches. Bompar's emphasis on fluvial discharge, not only from the Rhône but also from smaller rivers such as the Var, was a reflection of reality.

88. Olaus Magnus relates how in 1323 the Baltic Sea was "bound by the most bitter cold, so that it could be crossed on foot from the shore at Lübeck to Denmark and to Prussia, and lodgings were set up here and there at suitable places on the ice"; how "throughout the winter of 1399 the frost gripped lands and seas so hard that people came dryshod over the sound from Lübeck to the town of Stralsund and crossed from there to Denmark"; and how "in the year 1423 such an unparalleled, unheard-of frost lasted throughout the winter that horsemen crossed quite safely by the sailors' route from Gdansk in Prussia to Lübeck and then from Mecklenburg over the sea to Denmark, using lodgings on the ice." See Olaus Magnus, *Description of the Northern Peoples, Rome 1555,* 3 vols., ed. Peter Godfrey Foote, trans. Peter Fisher and Humphrey Higgens, with annotation derived from the commentary by John Granlund (London: Hakluyt Society, 1996–98), 1:59–60. Note that Olaus refers to his map simply as his "map" or his "Gothic map," never as the *Carta marina.*

89. Olaus Magnus, *Description of the Northern Peoples,* 1:100–101. Olaus named the whirlpool shown on his map "Carabdi." The mythical association endured: on Matthäus Greuter's *L'Italia* (1657), the Sicilian whirlpool is still labeled "Caridi" and "Scilla." See Roberto Almagià, *Monumenta Italiae cartographica* (Florence: Istituto Geografico Militare, 1929), pl. LXV, sheet 12.

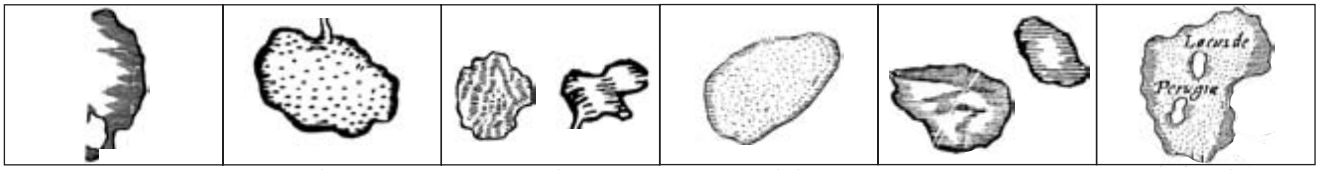
90. Dainville, in *Langage des géographes,* 153–54, suggests that coastal lagoons (*étangs*) were shaded according to depth of water. On Uberti's map of Lombardy (1515), continuous and close-set irregular lines fill the lagoons east of Ferrara, while the sea is marked with short peaked flecks like waves.

91. Lubin advised engravers to treat the outline of lakes like the sea where there was space, but otherwise to shade them completely ("They are covered completely with parallel dashes"); see Lubin, *Mercure geographique,* 304–5, also cited by Dainville, *Langage des géographes,* 154.

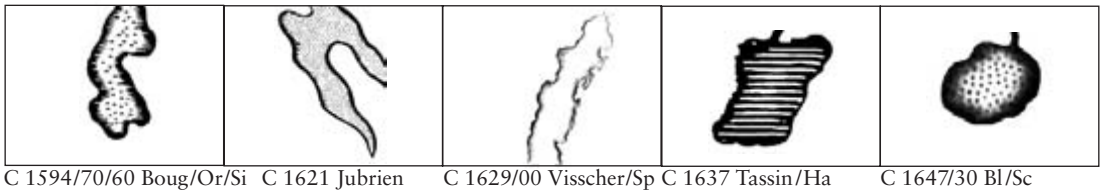
92. For example, Bartolomäus Scultetus's woodcut map of Upper Lusatia (1593) and Jean Jubrien's copperplate map of the diocese of Rheims (1623).

93. For example, Simeoni, Auvergne (1560), where the whole map is presented in perspective. On Mercator's map of Europe (1554), cross-hatching in the northwestern part of each lake gives the impression of water shaded by cliffs.

Inland Lakes



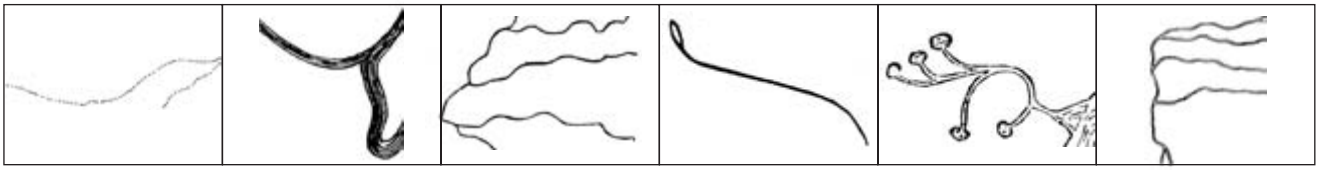
W 1528 Lazarus | C 1557 Ziletti | W 1559 Jordanus | C 1563 Porębski | W 1568 Apian | C 1578/36 Jode/Be



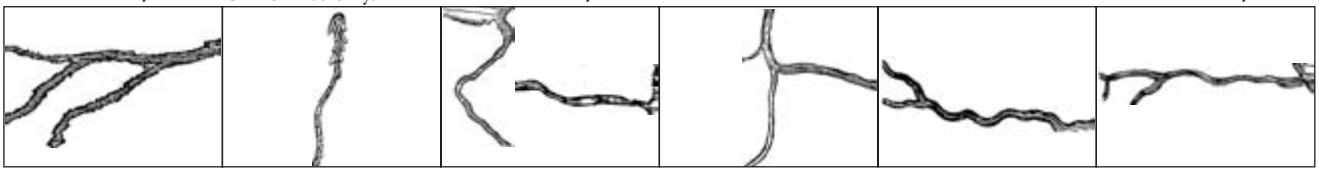
C 1594/70/60 Boug/Or/Si | C 1621 Jubrien | C 1629/00 Visscher/Sp | C 1637 Tassin/Ha | C 1647/30 Bl/Sc

FIG. 21.13. INLAND LAKE SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

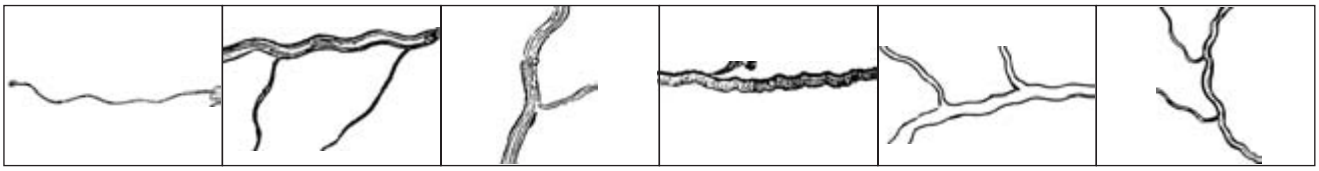
Rivers



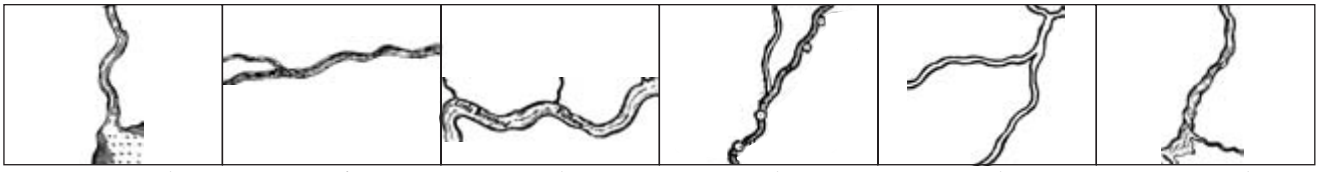
C 1477 Ptolemy/B | C 1482 Ptolemy/F | W 1482 Ptolemy/U | W 1492 Etzlaub | W 1493 Münzer | W 1513 Ptolemy/S



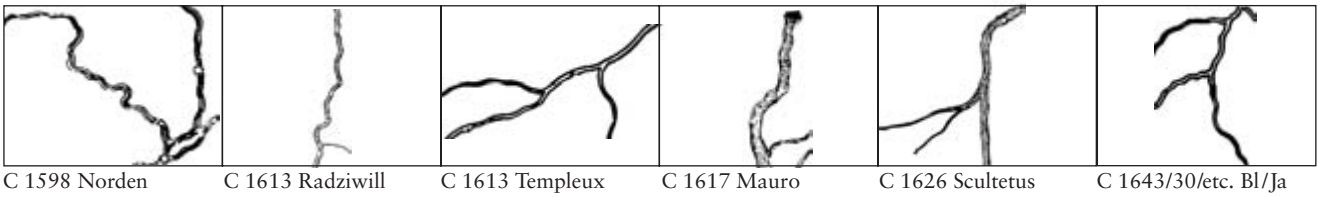
W 1523 Aventinus | W 1538 Pagano | W 1539 Olaus | W 1543 Anthonisz. | C 1545 Gastaldi | W 1548 Stumpf



C 1552 Sophianos | W 1555 Vopel | W 1556 Lazius | W 1557 Stella | C 1563 Porębski | C 1570/42 Ortelius/Ze



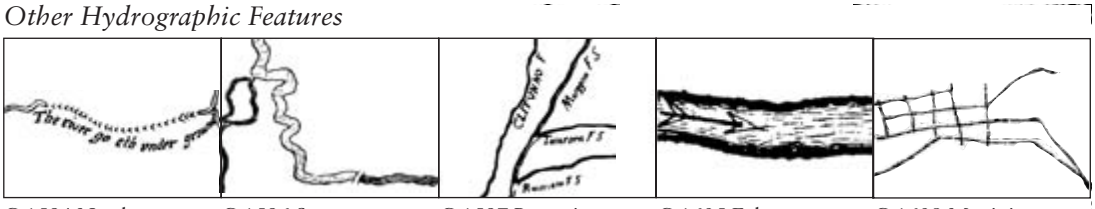
C 1578 Saxton/Gl | C 1587 Bonifacio | C 1593 Norden | W 1593 Scultetus | C 1594 Norden | C 1595/91 Ortelius/Bo



C 1598 Norden | C 1613 Radziwill | C 1613 Templeux | C 1617 Mauro | C 1626 Scultetus | C 1643/30/etc. Bl/Ja

FIG. 21.14. RIVER SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

Other Hydrographic Features



C 1594 Norden C 1596 Symonson C 1597 Parenti C 1605 Fabert C 1608 Magini

FIG. 21.15. SIGNS FOR OTHER HYDROGRAPHIC FEATURES. See appendix 21.1 for details of the maps from which the signs are taken.

also be found on late sixteenth-century maps, such as Bartholomäus Scultetus's map of Upper Lusatia (1593).[94] Matteo Pagano (1538) picked out a different aspect to emphasize, the tumbling waters of alpine headstreams, represented on his map by a pattern resembling inverted fish scales.

The space between the lines representing a river could be left empty, as on many of the maps of the first half of the period, or filled with longitudinal flow lines (continuous, discontinuous, or a mixture of both), transverse lines, or stippling. Some mapmakers continued the shading used for the sea inland to indicate tidal reaches (Anthonisz., *Oostlandt,* 1543; Philip Symonson, *Kent,*1596). Mapmakers who distinguished a river's tributaries from its main stream were always in the minority. Occasionally, a mapmaker indicated the steep banks of an incised river. Giovanni Andrea Valvassore deployed short, curved lines on both sides of the river to similar effect (map of Friuli, 1557), and François de La Guillotière's heavy scalloped lines may have been intended to represent the same feature (*L'Isle de France,* 1598). An alternative was to thicken the line on one side of the river. The most common technique was to use vertical hatching, especially on maps portraying the region in perspective, such as Natale Bonifacio's map of the Abruzzi (1587).

Signs for Other Hydrographic Features

Occasionally a mapmaker drew attention to a special feature or characteristic of local hydrology (fig. 21.15). William Smith marked the subterranean section of the Mole River on his map of Surrey (1602) using a line of inverted Cs—in imitation, presumably, of a cavernous subterranean course—without explaining the meaning of the sign.[95] Gellio Parenti distinguished seasonal from perennial streams by marking the former with a pecked (broken) instead of a continuous line and adding the letters *FS* (*Fiume secci,* or dry rivers—"those . . . which run when it rains," as explained in the key) to the name of the river on his map of Spoleto (1597). Abraham Fabert indicated the Moselle's direction of flow by an arrow (map of Metz, 1605). A special sign for artificial water courses such as canals or drainage channels was not necessary, because these are readily identified from the straightness and angularity of the lines. Thus Christiaan Sgrooten (1573) indicated newly reclaimed land by means of a grid of straight lines, as did Giovanni Antonio Magini on his map of Italy (1608).

RELIEF SIGNS

In Ptolemy's *Geography,* the world's main mountain ranges are listed, together with their coordinates. Yet mountains were not considered, in the Middle Ages any more than in classical times, to have any intrinsic interest apart from acting as barriers. In the early Renaissance, likewise, there was no particular concern about the mathematically accurate representation of all aspects of relief on a printed topographical map.[96] At the same time, an appropriate representation of the landscape was expected. Paul Fabricius was reproached by his contemporaries for the absence of hill signs on his map of Moravia (1569), which implied a flat landscape where "there should be mountain ranges."[97]

Signs for Hills and Mountains

As reflected in figure 21.16, there was little change in the way hills and mountains were shown in the Renaissance.

94. Circles for headstream springs were also being marked at the end of the sixteenth century (e.g., Scultetus, Upper Lusatia, 1593), and Lubin noted that lakes could be the source of rivers in *Mercure geographique,* 305.

95. It is possible that the feature was of current topical interest, and that Smith expected purchasers of his map to recognize it without further comment. It was alluded to in Edmund Spenser's poem *The Faerie Queene* (1596): "And Mole, that like a nousling Mole doth make/His way still vnder ground, till Thamis he ouertake." See Edmund Spenser, *The Faerie Queene,* ed. A. C. Hamilton (London: Longman, 1977), 4.11.32 (p. 514).

96. As in earlier times, mountain ranges were traversed when necessary during the Renaissance, but otherwise ignored. In many cases, an attempt to represent upland in detail would result in overcrowding and illegibility at the expense of features deemed more directly relevant to daily life (rivers and settlements, for instance).

97. Karel Kuchař, *Early Maps of Bohemia, Moravia and Silesia,* trans. Zdeněk Šafařík (Prague: Ústřední Správa Geodézie a Kartografie, 1961), 36.

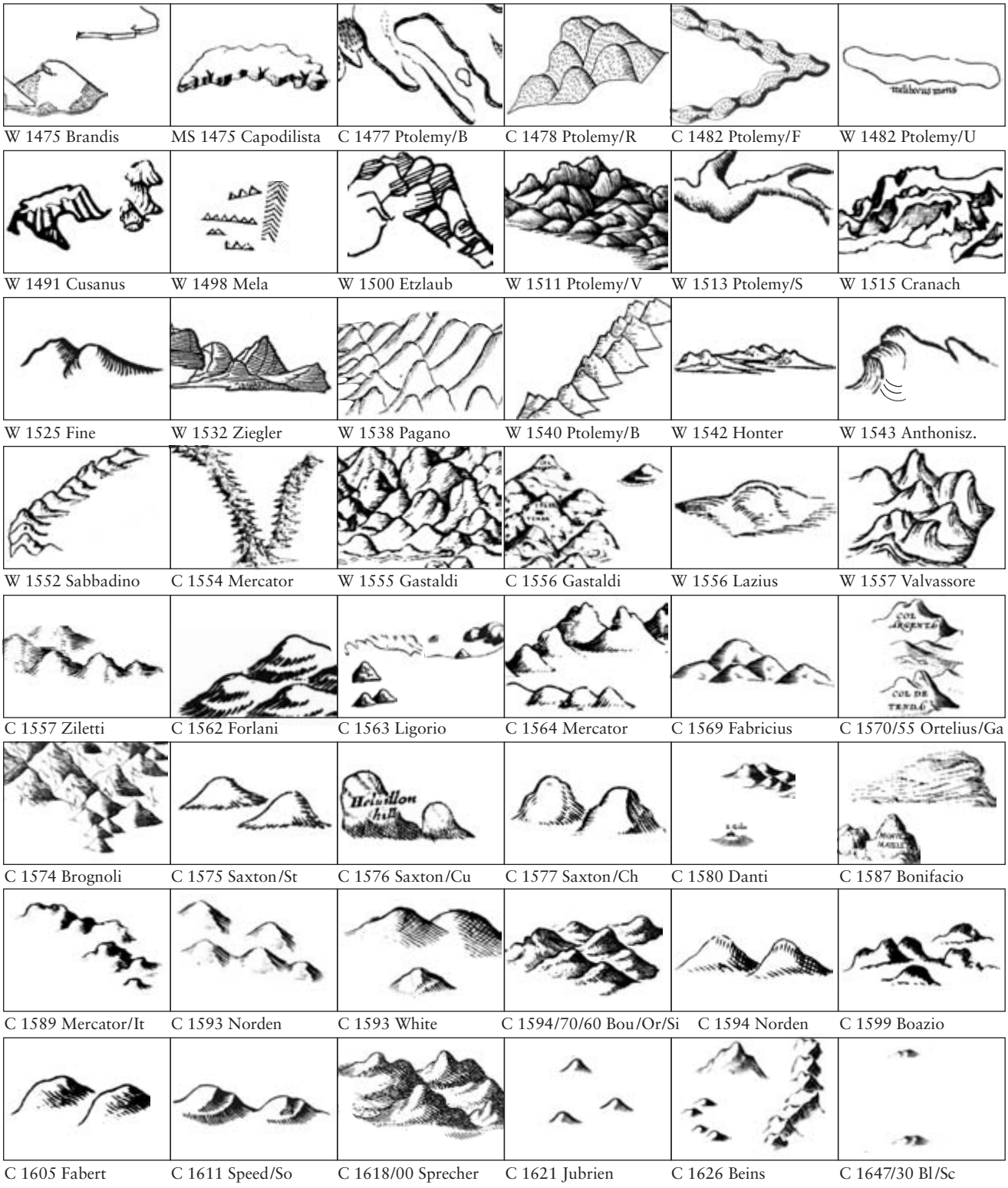


FIG. 21.16. HILL AND MOUNTAIN SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

The choice between representing upland from a vertical perspective and representing it from a horizontal perspective involved a difference of emphasis. Where the imagined viewpoint was from above, the sign stressed the areal extent of the upland area as a whole, and the location of each place within that area was relative to the surrounding line. Where a horizontal perspective was used, the mapmaker visualized the upland from outside, as if from the surrounding lowland or from a vantage point in the foreground, and the emphasis was on altitude and skyline. In theory, the external perspective had much to commend it. The profile of each mountain could be delineated individually, its flanks could be shaded to give an illusion of plastic relief, and the profiles could be graded to convey relative size and height. Grouped together, profile hill signs could also give a reasonable idea of the nature of the upland area and its major plateaus, ridges, deep dissections, valleys, and gorges. What the profile sign could not provide was a clear indication of the extent of each individual hill, nor could it be used to place other features within the upland area in mathematically correct relative positions. The hybrid hill sign, where the defining line was shaded on one side to give a plateau effect, may be seen as an attempt to combine the essence of both perspectives, as on some late fifteenth-century printed maps.[98]

Profile hill signs date back to prehistoric times, and their composition has remained unchanged.[99] On the printed topographical maps of the Renaissance, as on earlier manuscripts, the only structural variation in profile hill and mountain signs is the presence or absence of a line across the bottom. About one-third of those illustrated in figure 21.16 lack such a closing line. When an incomplete profile is colored, as on medieval manuscript maps, the limit of the painted area closes the sign. Had the visual difference between such "painted" and "linear" map signs mattered, Renaissance mapmakers and engravers would have ensured that the outlines of all signs were fully closed by the engraved line, but they did not.[100] On early modern printed topographical maps, hill signs were deployed in various ways: alone or touching each other at the base to form a chain; overlapping or massed (imbricated) and covering extensive areas; or portrayed in naturalistic or schematic style.[101]

Just as medieval artists were urged to copy from nature and to make a pile of suitable stones as a model if necessary, it is clear from the veracity of their naturalistic hill signs (and occasionally from related documents) that individual Renaissance mapmakers were also using sketches they had made in the field.[102] On other maps, the hill shapes are obviously imaginative, such as the cauliflower-like outlines of Hieronymus Cock's hills (map of Piedmont, 1552). On by far the largest proportion of maps, however, the profile sign is merely notional. These "molehill" or "sugarloaf" outlines may be pointed or rounded, conical, trifaceted, or smooth in outline, or may be stepped or indented, but do not bear much relation to physical reality in form, proportion, or distribution. Indeed, tricks of perspective may have occasionally been employed to convey additional ideas. It has been suggested, for example, that Mercator depicted the mountains in the foreground of his north-oriented map of the Holy Land (1537) twice as high as those in the middle and at the top in order to portray the Promised Land "as distant and teeming with habitation" in contrast to the Sinai Desert, in the foreground, which was sparsely populated and "with monstrous Byzantine peaks."[103] It is often said that Saxton exaggerated individual hills to indicate those he used as viewpoints. Less ambiguously, Bartholomäus Scultetus placed a small circle on top of a hill sign to indicate a "notable" hill, as explained in the key to his map of Upper Lusatia (1593). In general, though, little should be read from the size of profile hill signs other than a notion of varying them "according to the general elevation of the summits and landscapes represented" and to "convey an impression of topography rather than to provide precise information on the location and altitude of individual summits."[104]

The majority of profile hill signs are shaded to give at least an idea of three-dimensional shape. The usual shading is a form of linear hatching. This is composed of long or short strokes (or both) arranged in two or more bands

98. See, for example, the maps by Gabriel Capodilista (1475) and Claudius Ptolemy (1477). Hodgkiss, in *Understanding Maps,* 42, refers to what he sees as the beginnings of plan representations of hills at the end of the fifteenth century, when "mapmakers began to represent hills in plan, leaving the tops blank and engraving vertical shading around the slopes . . . [so that,] for the first time, a reasonably accurate impression of the length and breadth of mountain ranges was practicable." His description seems to refer to our hybrid hill sign.

99. See the examples in Delano-Smith, "Cartography in the Prehistoric Period," 71–74.

100. The idea offered by David Woodward for discussion in "The Image of the Map in the Renaissance," in *Plantejaments,* 133–52, esp. 146–47, that a "transformation from paint to line" distinguishes medieval and Renaissance maps, has proved to be untenable. In the first place, medieval illustration is no less linear than a printed map. In the second place, in any period, whenever color is used to fill the space between lines or—in the case of painted, as opposed to colored, maps—as the lines, it is the edge of the painted area that serves as the bounding line, and that completes the figure where a drawn, painted, cut, or engraved line is missing.

101. Triangles serve well to make the necessary visual impact for a mnemonic or pedagogic aid through stylistic simplification. See, for example, the coastal profiles in Pierre Garcie, *Le grand routier* (Rouen, 1531).

102. Cennini also advised artists to paint mountains in a "good style" and "to have them look natural"; see Cennino Cennini, *Il libro dell'arte,* 2 vols., ed. and trans. Daniel V. Thompson (New Haven: Yale University Press, 1932–33), 2:57.

103. Crane, *Mercator,* 88.

104. Evans and Lawrence, in *Christopher Saxton,* 32, make no comment on the role of the different engravers of Saxton's maps in this respect.

following the contour of each hill or, alternatively, shading one side or the other. A popular assertion holds that because "sensible draughtsmen have always worked with the light on their left," hill shading was always on the right.[105] This may be the general rule, but there is no shortage of examples in which the shading is on the left.[106] Sometimes cross-hatching was used for hill shading, either alone or in conjunction with linear hatching, as a way of strengthening an illusion of perspective.[107] Sometimes stippling was used instead of lines, especially on maps of areas where relief is relatively muted, as on Ortelius's version of François de La Guillotière's *L'Isle de France* (1598).

Plan view hill signs had been employed on some manuscripts of Ptolemy's *Geography* and on fifteenth-century regional maps such as William Wey's map of the Holy Land (1462). They were also used on the maps of the 1482 Ulm edition of the *Geography,* but became less common thereafter on printed maps, except for Erhard Etzlaub's map of the Holy Roman Empire (1501). The principle of indicating the areal extent of upland by a plan view sign continued to be observed occasionally on specialist manuscript maps, however, notably those created for use in a military context. John Rogers, for example, one of Henry VIII's military surveyors, used a "form line" to mark the break of slope on his maps of land in the vicinity of Boulogne (1547), but no other type of hill sign.[108] It is often said that profile signs are easier than plan view signs to recognize because they match the average map user's personal experience. It may be no accident, then, that the year before Etzlaub used plan view signs on his map of the Holy Roman Empire, he used profile signs on a map destined for immediate popular dissemination, the *Rom Weg* map of 1500.

Signs for Scarps, Volcanoes, and Dunes

Some Renaissance mapmakers had a sharper eye than others for geomorphological detail. Valley terraces and scarp faces, rendered by an informal style of hachuring, are a striking feature of two of the new maps in Martin Waldseemüller's Strasbourg edition of Ptolemy's *Geography* (1513) (fig. 21.17).[109] Close-set short lines indicate the scarps of the Paris basin and those of the fluvial terraces in the valley of the Rhine on the maps of France and Lorraine, respectively.[110] Sebastian Münster also used curving hachures to outline the sides of the Rhine trench on his map of the Heidelberg district (1528). Much later, on a map otherwise virtually devoid of relief, Christophe Tassin used similarly curved hatching for the steep valley bluffs along the north side of the Loire (map of Orléanais, 1634).

Ptolemy described volcanoes simply as mountains, and Etna was shown in this way on the manuscript maps and on the earliest printed versions of the *Geography* (1477, 1478). For the Ulm edition of 1482, however, bold flames were added to the hill sign on both new and old maps (see fig. 21.17). Waldseemüller's rendering of Etna in his edition of the *Geography* is one of the most dramatic: flames leap from the mountain top as volcanic bombs fly through the air (1513).[111] Dunes were treated as minuscule hills (fig. 21.18). The great expanses of dune along the west coast of the Netherlands or the southern shores of the Baltic were indicated on Nicolaus Cusanus's Eichstätt map (1491) by means of a mass of tiny unshaded profile hill signs.

Whether the area between the mountain and hill signs on printed maps was left entirely blank or at least partially filled in with some sort of ground lines may have been a matter of economics. Publishers of the early printed editions of Ptolemy, in the manner of the commercial atlas printers of the later sixteenth century and the first half of the seventeenth, tended not to attempt to shade the ground. Individual mapmakers (whose maps accounted for the vast majority of sixteenth-century printed topo-

105. Lynam, "Ornament, Writing and Symbols," 324. The traditional assumption has been that most woodblock cutters and copperplate engravers were right-handed, and that the minority who shaded hills on the "wrong" side were thus left-handed. In speculating on the explanation, it should be remembered that the engraver would have been working on a mirror image. To produce shading on the right side of the sign, he would have been engraving the left side of the sign on the copperplate. Either way, the argument is unconvincing as an explanation for the tendency to shade hill signs on the right.

106. Saxton's engravers shaded the left side on three out of thirty-four maps of the English and Welsh counties.

107. Unlike the cross-hatching in coastal signs, cross-hatching in hill signs continued throughout the Renaissance; see, for example, Norden, Surrey (1594), and White, Isle of Wight (1593; published by Speed in 1611). It has been suggested that the cross-hatching on Johann Grüninger's 1527 reissue of Waldseemüller's map of the world was one of several "new features"; see Miriam Usher Chrisman, *Lay Culture, Learned Culture: Books and Social Change in Strasbourg, 1480–1599* (New Haven: Yale University Press, 1982), 140. See, however, Pollard's reference, in *Fine Books,* 115, to cross-hatching on illustrations in Breydenbach's *Peregrinatio in Terram Sanctam,* cited in note 82.

108. BL, Cotton MS. Augustus I, ii, 77. Reproduced in *The History of the King's Works,* 6 vols., by Howard Montagu Colvin et al. (London: Her Majesty's Stationery Office, 1963–82), vol. 3, pl. 40.

109. Campbell credits Lehmann for defining, in *Darstellung einer neuen Theorie,* the modern, "scientific" practice of hachuring, in which length of line, thickness of line, and the interval between each line is proportional to the slope. Campbell also points out that Lehmann's ideas were dominated by the requirements of military commanders and that, "since slopes greater than 45° rendered ground impracticable for manoeuvring upon, he dealt only with slopes from 0° to 45°"; see Campbell, "History of Cartographical Symbols," 106.

110. Taylor, in "Regional Map," analyzes details of relief portrayed on these maps, suggesting that information was the result of firsthand observation or "survey."

111. For a selection of signs for Etna on maps from the fifteenth to the nineteenth century, see "Mount Etna and the Distorted Shape of Sicily on Early Maps," *Map Collector* 32 (1985): 32–33 and 56.

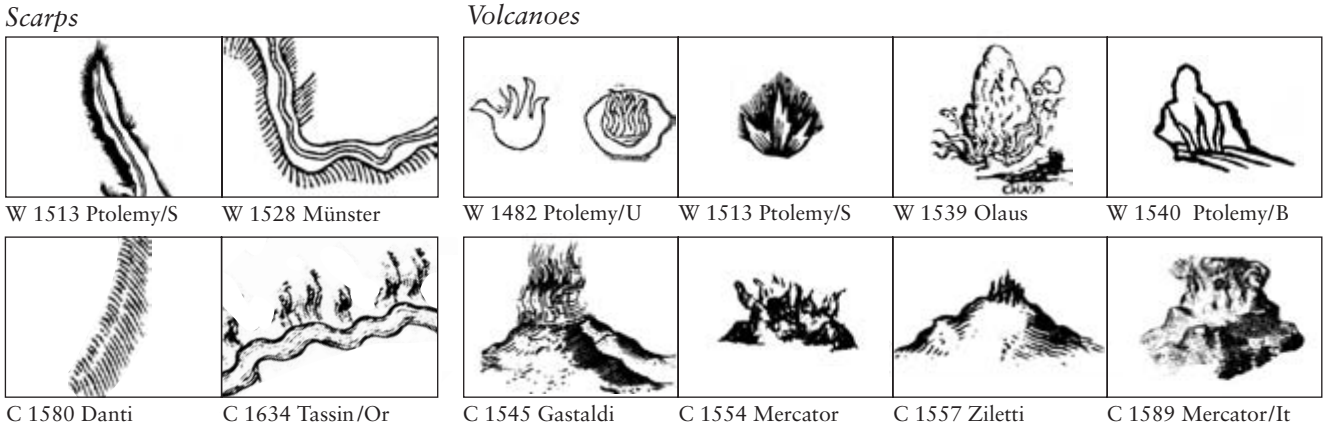


FIG. 21.17. SCARP AND VOLCANO SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

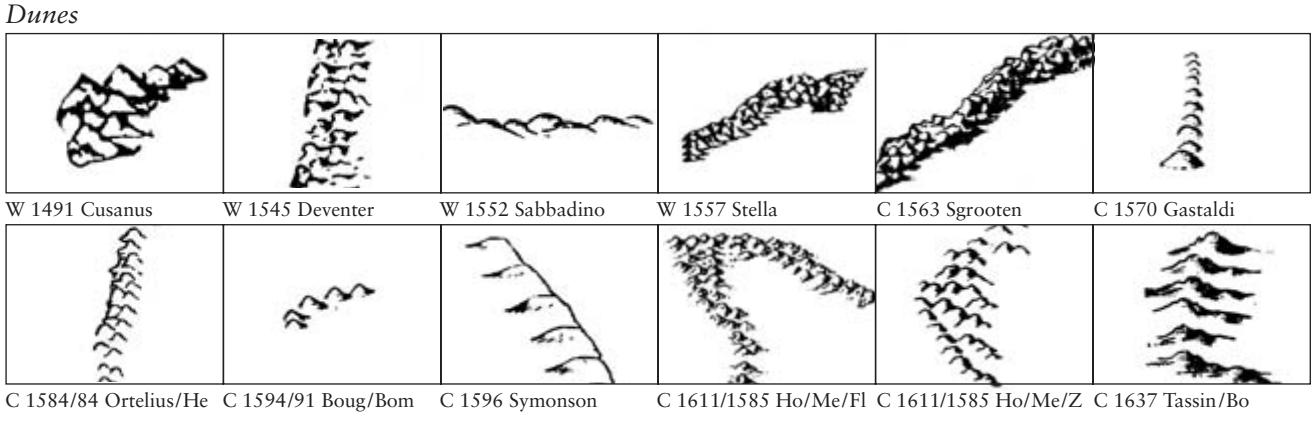


FIG. 21.18. DUNE SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

graphical maps) were more likely to add ground lines or vegetation to otherwise empty spaces between areas of hills and mountains. Short lines arranged as hummocks, irregular hatching, and freely distributed dashes were used indiscriminately, irrespective of whether the land was likely to be predominately grassy or cultivated.[112] Generally speaking, it is probably fair to suggest that there was a greater interest in the physical environment earlier in the Renaissance than later. Eight different signs for hills or other landforms are found on the early printed Ptolemaic maps, but by the end of the sixteenth century commercial atlas publishers were issuing topographical maps with little more than a notional and sparse scattering of inappropriately shaped and insignificantly sized profile hill signs. On many of these atlas maps, no relief at all is shown. There is none, for instance, on nearly half the maps in both Jean IV Leclerc's and Christophe Tassin's atlases of France (1619 and 1634, respectively), except perhaps that filling an otherwise empty area in a corner or along an edge of the map. Support for the "developmental process," "logical progression," or "systematic shift" that some commentators have thought they saw in the ways relief and landforms were depicted in the Renaissance is difficult to find.[113]

VEGETATION SIGNS

Forests and woods, like marshes, have always had considerable economic importance but, at the same time, have been major impediments to military operations and travel. Major forests were mentioned by Ptolemy and shown on maps in the *Geography*. Trees and forests feature promi-

112. See, for example, Apian's map of Bavaria (1568) and Lavanha's map of Aragon (1620). This category of information is not illustrated in the figures.

113. Among others, see Denis Wood, "Now and Then: Comparisons of Ordinary Americans' Symbol Conventions with Those of Past Cartographers" (paper presented at the 7th International Conference on the History of Cartography, Washington, D.C., 7–11 August 1977), a version of which was published under the same title in *Prologue: Journal of the National Archives* 9 (1977): 151–61. The phrase "logical progression" is found in David J. Unwin's review of *Cartographic Relief Presentation,* by Eduard Imhof, *Bulletin of the Society of University Cartographers* 17 (1984): 39–40.

nently in medieval painting and illumination. Yet few Renaissance printed topographical maps provide more than a token indication of the presence of trees in the landscape.[114]

Renaissance mapmakers inherited a rich graphic vocabulary from medieval and Roman times for the vegetation of Europe. Contemporaries, it may be suggested, were less likely to be confused than modern readers over the botanical, geographical, and legal aspects of different terms and the different "status" of different types of vegetation. Today, in general parlance, the terms "wood" and "forest" usually indicate a dense stand of trees with more or less close-touching canopies. However, in the Middle Ages and for much of the early modern period throughout Europe, the two words had quite different legal connotations: "forest" designated land set apart from (i.e., "outside") common law, traditionally for the use of the crown or the nobility.[115] After centuries of exploitation, many forests are not particularly well wooded today and may not have been so even by the Renaissance.

Signs for Trees

Trees on early modern printed topographical maps are represented pictorially, with stylized profile signs. As figure 21.19 shows, there was considerable variation in the way the signs were composed. Some mapmakers stressed a tree's structure, with more or less horizontal lines, decreasing in length toward the top, on a single trunk, as in Sebastian Münster's characteristic "bottle-brush," "Christmas tree," or "telegraph pole" signs on maps such as his map of the environs of Heidelberg (1528) and his map of Europe (1536). Other mapmakers imitated the rounded profile of the canopy. Some drew the trees individually even for major areas of wood or forest, while others massed the signs. Some engravers, such as Forlani, allowed their tree signs to become mere tokens that looked more like grass than a tree or even a shrub, often larger than adjacent town signs. Andrea Pograbski (map of Poland, 1569) demarcated the outer edge of forests with a continuous line as if to emphasize the contrast between the darkness of the forest interior and the openness of the surrounding farmland, but on other maps an enclosing line or a fence around an area of forest specifically indicates its legal boundary. Saxton indicated Ashdown Forest (map of Kent, Sussex, Surrey, and Middlesex, 1575) and the Peak Forest (map of Derbyshire, 1577) in such a way but identified other forests by name only (e.g., Windsor Forest on the map of Kent, Sussex, Surrey, and Middlesex, 1575, and the Forest of E[a]st Bere on the map of Hampshire of the same year). The unbounded Forest of Macclesfield (map of Cheshire, 1577), by contrast, contains not a single tree sign.

A single map may contain more than one style of tree sign. The extent to which the different signs were intended to differentiate coniferous from deciduous woodland is debatable. Where the distribution of the different signs on the map can be compared with what is known of local ecological history, as in the case of Timothy Pont's regional maps of Scotland (ca. 1596–ca. 1624), the relationship has been shown to be weak.[116] On maps showing large parts of mountainous continental Europe, it could be said that a mixture of the two main types of tree signs served as a reminder of the way the dominant species changes according to aspect and altitude were it not for the fact that the two types of signs are used together on only a minority of maps. Just occasionally it seems possible to identify a particular species. Münster depicted date palms on his version of the "old" maps in the *Geography* (1540), and there seem to be larches on maps of Scandinavia (Olaus Magnus, 1539) and Bohemia (Pieter van den Keere [Petrus Kaerius], 1618), cypresses on a map of the Roman Campagna (Eufrosino della Volpaia [Euphrosinus Vulpius], 1547), and willows on one of Friesland, the Netherlands (Jacob van Deventer, 1545). Even more occasionally, a single tree of special significance is shown. Jean Jolivet portrayed an elm tree that marked the meeting of four provinces (Berry, Bourbonnais, Auverge, and Limousin), explaining this in a note beside the sign (map of France, 1560), and Saxton singled out a solitary hilltop tree in Wiltshire, which he (or his engravers) called "Ringhtons Ashe" on the map of Dorset (1575) but "Knigtons Ashe" on the map of Wiltshire (1576).

Marsh Signs

Nontree forms of vegetation such as heath, grassland, and scrub (garigue or maquis) are rarely if ever differentiated, and marsh is by far the most commonly depicted nontree vegetation on early modern printed topographical maps

114. Locally, however, forest and woodland were often surveyed and mapped, usually in an attempt to assess timber resources, with the maps remaining in manuscript. The creation of national navies in the sixteenth century led to overexploitation of forests and a shortage of suitable timber.

115. From the Latin *foris*. The Latin for woodland is *silva*.

116. T. C. [Christopher] Smout, "Woodland in the Maps of Pont," in *The Nation Survey'd: Essays on Late Sixteenth-Century Scotland as Depicted by Timothy Pont,* ed. Ian Campbell Cunningham (East Linton: Tuckwell, 2001), 77–92. Many of Pont's maps were later used by Willem Jansz. Blaeu; see Jeffrey C. Stone, "Timothy Pont: Three Centuries of Research, Speculation and Plagiarism," in *The Nation Survey'd,* 1–26, esp. 16. Similar comments are made about Lazarus's tree signs (see his map of Hungary, 1528), but fail to do justice to the extensiveness of the forests in the region at that time; see György Balla, "Other Symbols on Lazarus's Maps," in *Lazarus Secretarius: The First Hungarian Mapmaker and His Work,* ed. Lajos Stegena, trans. János Boris et al. (Budapest: Akadémiai Kiadó, 1982), 87–88.

Trees

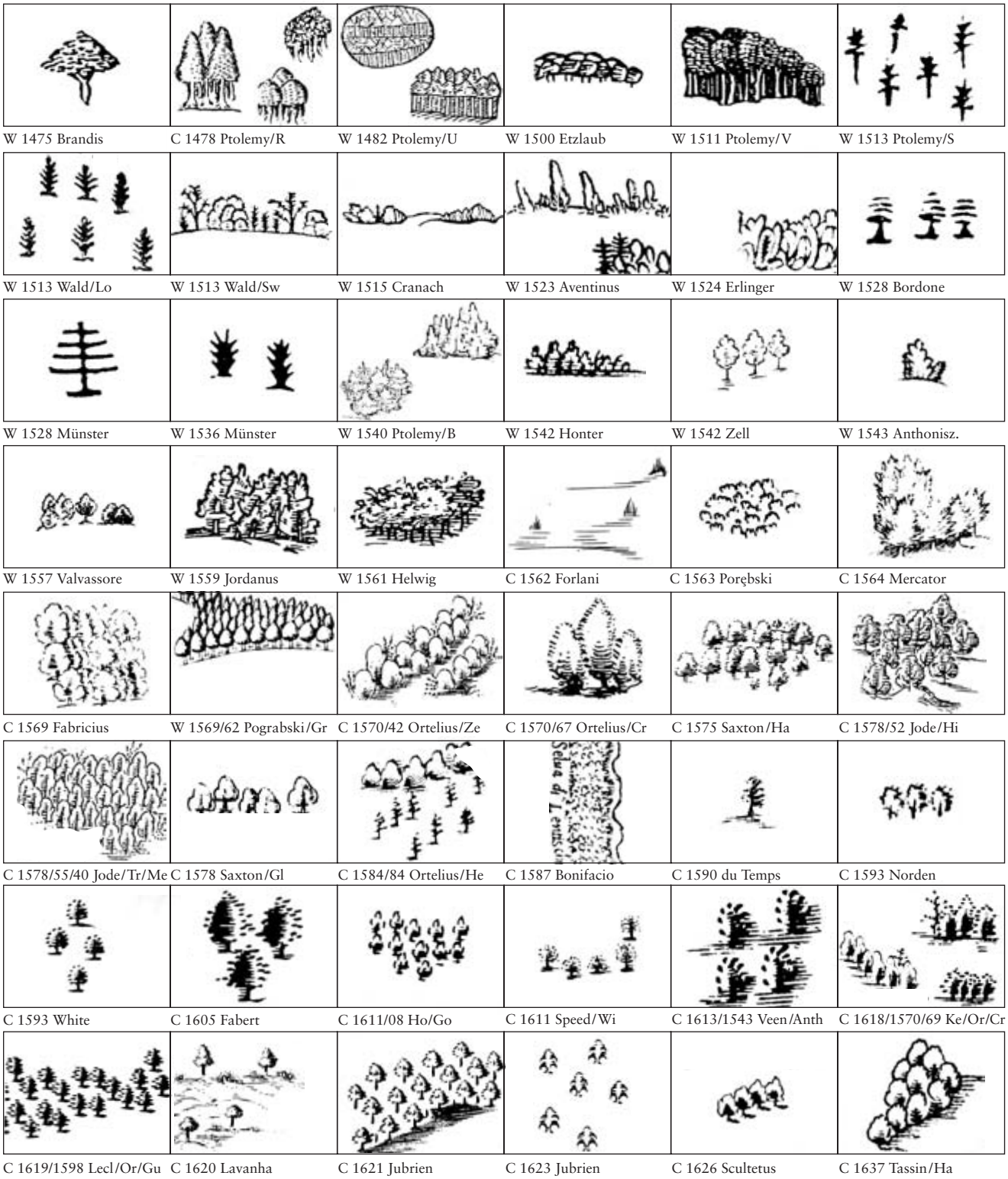


FIG. 21.19. TREE SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

Marsh

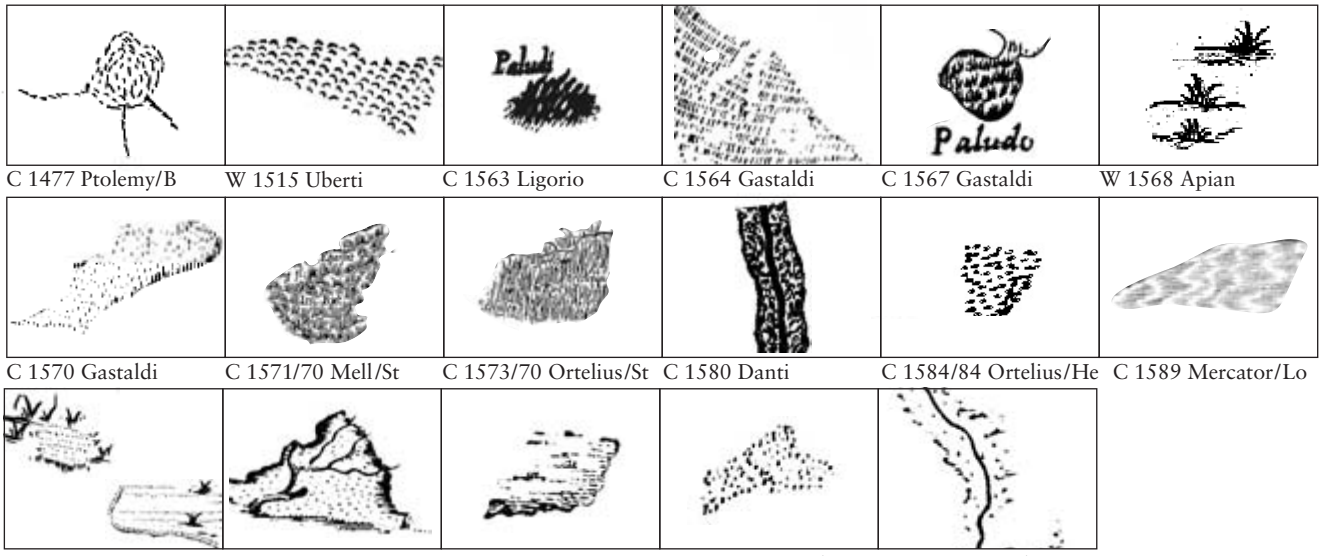


FIG. 21.20. MARSH SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

(fig. 21.20).[117] In Latin editions of Ptolemy's *Geography,* marshes are referred to as *paludes* (e.g., the Paludes Thiagula, now Lake Jalpuk, between the two distributaries of the southern branch of the Danube). In the Bologna edition of the *Geography* (1477), the oases of the Libyan desert are stippled in the manner of marshes.[118] By the middle of the sixteenth century, few European mapmakers would have been unaware of widespread complaints about persisting or encroaching marsh. Over a century later, Lubin advocated showing swamps and marshy places on maps because of their inconvenience to travelers.[119]

Marsh was usually represented by pictorial signs but occasionally by abstract signs. In the former, the bent leaves of marsh plants or the thickened heads of the reeds on their curved stems are clearly portrayed on some maps, but are more stylized on others. Heinrich Zell's sign, composed of three or four short vertical lines underlined by one or two horizontal lines, presages the modern conventional sign (map of Prussia, 1542). Lubin later explained this sign: "Marshes are engraved as tiny parallel broken lines with little vertical strokes as if representing reeds."[120] Another highly stylized marsh sign was used by Luc Antonio degli Uberti (map of Lombardy, 1515). Composed of short, down-curving lines, it communicates an impression of the hummocky surface of well-developed and relatively dry marsh. Yet another variant is Egnazio Danti's representation of the infamous marshy bottom of the Val de Chiana (map of Perugia, 1580) by means of little loop signs also suggestive of an ecologically advanced and rather scrubby vegetation rather than a reed-studded wetland.[121] To represent the extensive marshes of the Po River delta shown on Gastaldi's map of Padua (1568), the engraver Girolamo Olgiato used his engraving tool with a downward stabbing movement to produce an effect evoking dense reed beds. The wettest marshes of all tended to be shown by means of abstract signs: rows of pecked lines arranged horizontally or obliquely, or small groups of horizontal dashes mimicking clumps of plants in calm water. Mapmakers varied their own practice: in 1595, Magini used a zigzag sign for such wetlands on his map of Bologna but two years later chose instead long rows of vertical dashes on his map *Romagna.* As on the Ptolemaic maps, a marsh is sometimes noted only by the word *paludes* or its vernacular equivalent, as on Ortelius's version (1570) of the map of the Auvergne by Gabriele Simeoni (Gabriel Symeoni) (1560).

117. Marsh is shown on about a fifth of the maps inspected. On some maps marsh but no trees is shown (e.g., Gastaldi, Padua, 1568; Magini, Romagna, 1597).

118. For example, *Cleartus palus* (marsh of Cleartus) on the third map of Africa.

119. "Across which it is impossible to travel"; see Lubin, *Mercure geographique,* 306.

120. Lubin, *Mercure geographique,* 306.

121. For a color reproduction of Leonardo da Vinci's map of the Val di Chiana marsh, dating from about 1502, see Martin Clayton, *Leonardo da Vinci: One Hundred Drawings from the Collection of Her Majesty the Queen,* exhibition catalog (London: The Queen's Gallery, Buckingham Palace, 1996), 97, and detail on 99.

SIGNS FOR BOUNDARIES

On the whole, features of human geography predominate on maps of the Renaissance period, especially from about the 1530s or 1540s onward. One of the most basic aspects of that geography, in one form or another, is territory. Ptolemy listed each town according to the tribe to which it belonged and, by implication, in whose territory it was located. In early modern Europe, the forging of the medieval mosaic of feudal principalities and city republics into nation-states, and the concomitant rise of nationality, underlay a new preoccupation with political boundaries. The process was slow, and much of Europe (apart from the longer-established nations of England and Hungary) remained politically fragmented throughout the period considered in this volume. While there were still eighteen states in Italy, and some three hundred in Germany, in other parts of Europe the interplay of religious, economic, and political factors promoted national consolidation and the definition of territories and their external boundaries.

Yet relatively little of the preoccupation with national affairs is reflected in the majority of the maps discussed in this chapter. One reason may have been that these general maps were destined for use by the general public, for whom external boundaries were of little direct concern; as late as 1678, Lubin reported that he had seen "towns, whose inhabitants did not know in which Province they were."[122] For such map users, there would have been no need to outline the region identified by a map's title. It was, moreover, not always easy to know what to show on a map. In 1563 Christiaan Sgrooten was prevented by the authorities of Gelderland from publishing his map of the province until he had corrected errors in his representation of the provincial boundary.[123]

Signs for Political Boundaries

The simplest and least contentious method of identifying a political unit without putting a line around it on the map was to name it in the size and style of lettering appropriate to the status of the territory or, as already noted, to identify the unit in question in the title. Another way was the system used on the manuscript maps for Ptolemy's *Geography,* namely, to code each place according to the unit to which it belonged.[124] Some of these codes found their way onto maps in early printed editions, such as the fifth map of Europe in the Florence edition of 1482. Most common was a third method, which was to make the central place of the political unit represent the entire territory. The boundaries of ecclesiastical parishes, for instance, were never represented on early modern printed topographical maps. Instead, the village sign was described in the key as signifying a "parish." Other territorially defined functions could be indicated in this way. Tilemann (Tilmann, Tillmann) Stella placed an asterisk by certain settlement signs on his map of the county of Mansfeld (1561; engraved 1570) to indicate that it was the central place of a magistrate or *amptman* (modern *amtmann*).

Yet another way of identifying a political unit was to use color. Color is not much discussed in this chapter because almost all maps were printed in black and white (the notable exception was Waldseemüller's experimental map of Lorraine of 1513). Even when an original map was colored, later versions were likely to be left uncolored (as in the case of Münster's version of the routes shown by Claudianus on his map of Bohemia of 1518) or colored differently. For the identification of political units, coloring had the advantage of being conveniently imprecise (assuming the colorist was not following—as on the Dutch atlas maps of the seventeenth century—a printed boundary line). A broad line of color could be made to fade toward the edge of the unit or, as on Etzlaub's *Rom Weg* map of 1500, to run into mountains or forests. In 1528, Lazarus divided Hungary with a dotted black line and colored yellow the part overrun by the Turks and pink the part remaining under Christian control.

Even in the second half of the period, when a boundary of some sort can be found on about three-quarters of the maps (fig. 21.21), few maps contained more than two levels of boundaries. Where internal boundaries were included, the line used was not necessarily any different from that of the external boundary.[125] Continuous printed lines for boundaries were, for obvious reasons, rarely used, and those on the maps in the Bologna *Geography* (1477) must have created considerable confusion, because on those maps rivers were shown by means of pecked lines.[126] Such rare exceptions apart, boundary lines on printed topographical maps were always shown by means of discontinuous lines. These may have been composed of points (pricks), short vertical lines, or pecked lines. Gastaldi refers to the short vertical lines used on the

122. Lubin, *Mercure geographique,* 50.

123. Sgrooten's map is now lost; see Karrow, *Mapmakers of the Sixteenth Century,* 481.

124. On Ptolemy's signs, see O. A. W. Dilke, *Greek and Roman Maps* (London: Thames and Hudson, 1985), 158–59. Some of these codes found their way onto maps in early printed editions.

125. Out of the four main English county mapmakers between 1574 and 1610, two used different lines to distinguish external and internal lines (William Smith and John Speed), and two did not (Christopher Saxton and John Norden).

126. In the early editions of Ptolemy's *Geography,* a solid line was used alone once (Rome, 1478); in other editions it was used in contradistinction to a second (lower) level of territory (Ulm, 1482; Strasbourg, 1513).

Political Boundaries

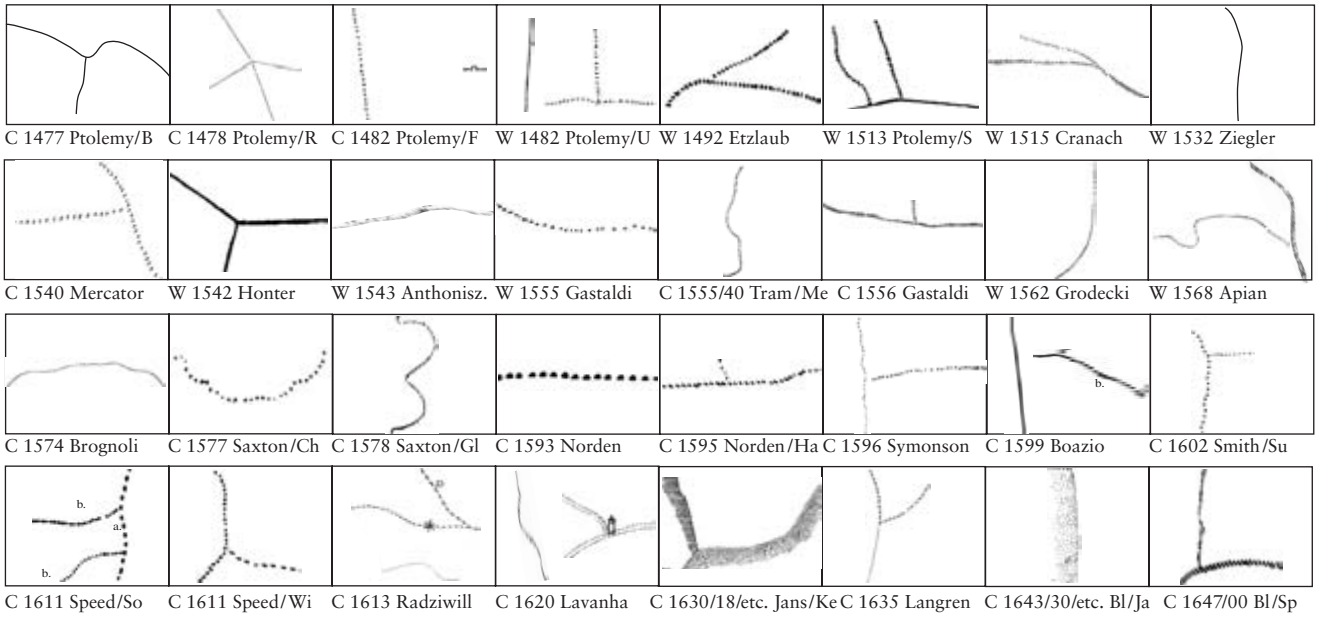


FIG. 21.21. POLITICAL BOUNDARY SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

woodcut version of his map of Piedmont (1555) as "small thin points" (*p[u]ntifini piccoli*), although it is only on the copperplate version of 1556 that the lines were indeed composed of little dots. Both pricked and pecked lines seem to have been engraved freehand rather than created by a spiked wheel, and the jabbing of the burin frequently resulted in visibly triangular dots, especially in the second half of the sixteenth century; for example, in figure 21.21, see the lines from Christopher Saxton's map of Cheshire (1577) and John Norden's map of Middlesex (1593).

Other forms of boundary lines were thought up as needed. Wolfgang Wissenburg (Wyssenburger) used a ropelike sign (created by inserting oblique hatching between parallel lines) to demarcate the historical tribal boundaries on his map of the Holy Land (1538). Philipp Apian used a deep band of vertical hatching for the boundary between Upper and Lower Bavaria in his map of 1568, quite distinct from the pecked lines used for the boundaries of the estates into which Bavaria was subdivided (see fig. 21.21).[127] In 1599, Boazio used small closely set circles for the Irish county boundaries.[128] Prince Radziwill used a pecked line as the basis of all boundaries on his map of Lithuania (1613), making it thinner for the internal divisions and adding circles and asterisks to distinguish the former frontier from the new.[129] João Baptista Lavanha (Juan Bautista Labaña) (1620) portrayed the stone pillars that stood where the boundaries of two or more kingdoms joined those of the kingdom of Aragon.[130]

It is doubtful that changes made to the way boundary lines were depicted on printed maps in the early modern period reflected changed attitudes toward them. It is interesting, though, to note that where Van den Keere had used a single pecked line to indicate the Bohemian frontier, Janssonius added not only a second pecked line but also a broad band of stippling fading toward the

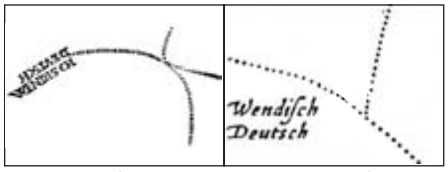
127. On colored copies of Apian's map, outlying parts of individual estates were colored the same as the estate to which they belonged. For (reduced) reproductions in color, see Hans Wolff, et al., *Philipp Apian und die Kartographie der Renaissance,* exhibition catalog (Weißenhorn: Anton H. Konrad, 1989), 77–99.

128. Boazio's map also shows what Andrews describes as "a sinuous line, engraved in the manner of a territorial boundary"; see Andrews, "Boazio's Map," 32. However, "for most of its course this line corresponds to no known feature of physical or political geography," and Andrews concludes that it must indicate something quite different, such as the limit of some of the different sources he was using. See also J. H. Andrews, *Shapes of Ireland: Maps and Their Makers, 1564–1839* (Dublin: Geography Publications, 1997), 82 (fig. 3.10).

129. The asterisked section indicated the contemporary frontier of the grand duchy after it had lost territory in 1569 through the Act of Union; see Karol Buczek, *The History of Polish Cartography from the 15th to the 18th Century,* trans. Andrzej Potocki (1966; reprinted Amsterdam: Meridian, 1982), 60.

130. Andrews calls the representation of these markers "junction-symbols"; see J. H. Andrews, *Plantation Acres: An Historical Study of the Irish Land Surveyor and His Maps* ([Belfast]: Ulster Historical Foundation, 1985), 118. English county mapmakers copied Saxton and each other in indicating the "shire-meres," stone markers at the meeting point of two or more county boundaries.

Linguistic Boundaries



W 1593 Scultetus C 1640/1593 Bl/Sc

FIG. 21.22. LINGUISTIC BOUNDARY SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

outer edge (1630/18), as if for emphasis.[131] When Willem Jansz. Blaeu reproduced the map in 1643, he dropped the parallel lines and retained only the band of stippling.

Signs for Linguistic Boundaries

A rare example of a nonpolitical boundary line on a Renaissance printed topographical map is the linguistic boundary shown by Bartholomäus Scultetus on his map of Upper Lusatia (1593) (fig. 21.22). Scultetus had already marked the provincial boundary (with a line of alternating triangles and inverted triangles) and the limits of the territory of the city of Görlitz (with a continuous line with hatching along the inner side). The third boundary on his map demarcates areas inhabited predominantly by German speakers from those of Wendish speakers.

SIGNS FOR SETTLEMENTS

In human geography, settlements are paramount and, because of the tendency to elaborate on the nature of places shown, settlement signs have always been the most complex of all map marks. In theory, a place need be no more than located on a map, but in practice settlements have also been ranked or qualified in some way. Inaccuracies in settlement classification could upset contemporaries. Fabricius was reproached for errors in this respect as well as for his depiction of upland on his map of Moravia (1569). A century later, Lubin reported that the inhabitants of Palaisseau, a bourg near Paris, were angry that their town had been shown on a map as a mere village.[132]

Over 90 percent of the maps sampled show more than one category of settlement. What criteria were involved in such ranking are not, however, always clear. Administrative status is implied in the distinction between city, town, and village. Function is indicated in the case of places with markets, monasteries, or castles. Settlement form is given when places are described as walled ("closed") or unwalled ("open"). None of these criteria were any more mutually exclusive in early modern times than they are today. Nor was the elaboration of a basic place-sign with such additional details new; variations in the place-signs on the medieval manuscript maps for Ptolemy's *Geography* appear to match the three settlement ranks identified in the text: *illustria oppida* (major towns), *secunda oppida* (second-order towns), and *tertia oppida* (third-order towns).[133]

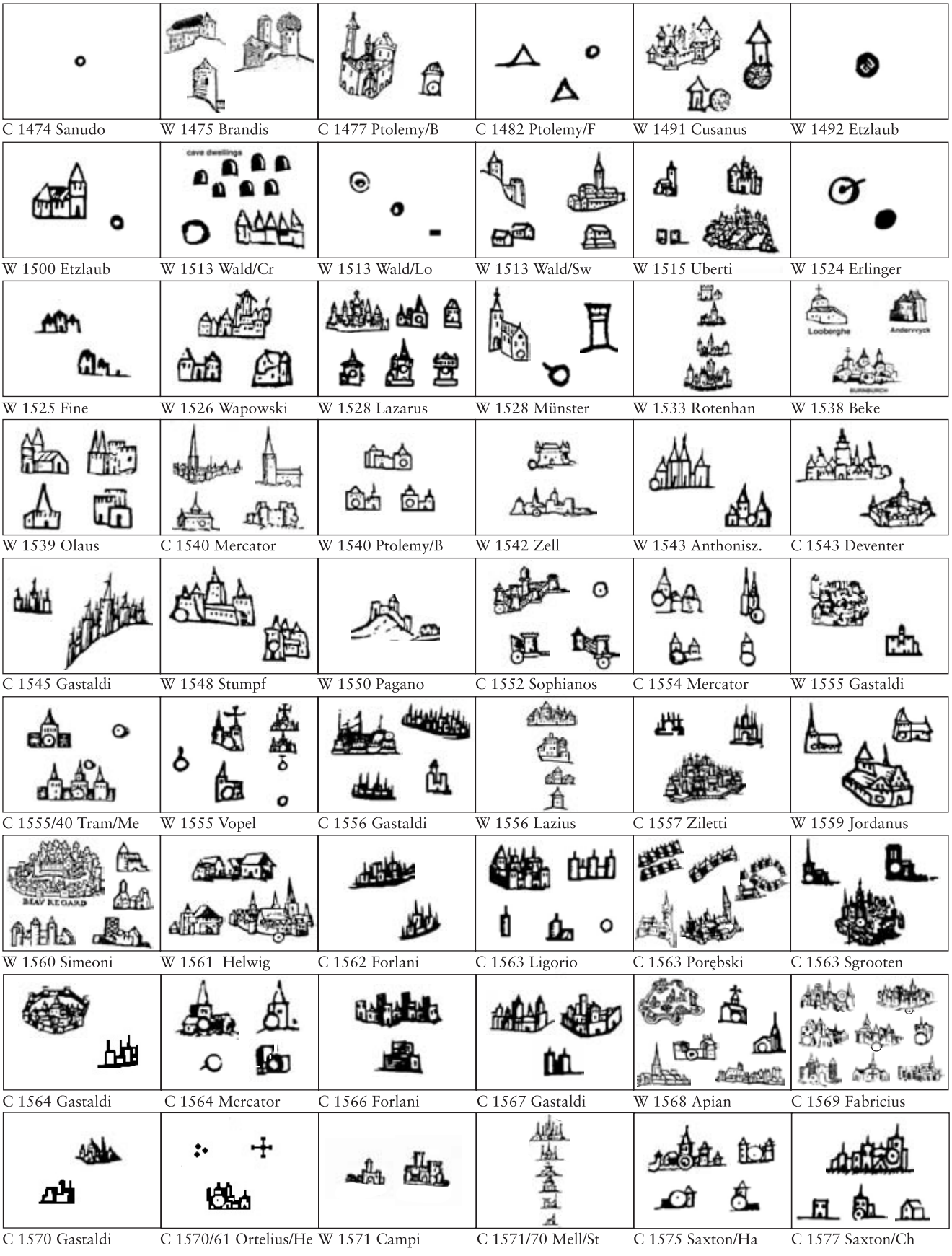
Medieval compilers, or copyists, of maps for the *Geography* also took care to distinguish, by adding a black point or tiny cross near the place-sign, settlements positioned on the map according to astronomical data as opposed to those that were just interpolated. Many Renaissance mapmakers continued the practice, using a location dot to pinpoint the exact site of a settlement—the point from which distance measurements were to be taken—sometimes indicating if this was plotted from astronomically determined coordinates. In the key on his map of Gelderland (1543), Jacob van Deventer advertised the distinction: "Lest you be deceived, all places which do not have this sign ⊙ are those for which we have not wished to give an exact position [as] free access to them was not always available to us." However, he continued, the latter "are less far from their true position than the best [indications] found in that map which was published by others before this one."[134] By no means were all places so treated; about a quarter of the maps sampled have no location dot for any settlement category, and on about half it is provided only for selected categories, becoming more

131. Janssonius also supplied internal boundaries, composed of a fine dotted line flanked by a band of hatching. Janssonius's map was included in his and Hondius's edition of Mercator's 1636 atlas. On the original map of 1567 or 1568, Criginger had shown no boundaries. Ortelius added only a short section of boundary in the northeastern corner of the map. Van den Keere kept to Ortelius's version, but Janssonius rearranged the map to a considerable degree, altering the signs for settlement, replacing the written details of economic activity supplied by Ortelius with abstract signs (explained in the key), completing Bohemia's external boundary, and inserting internal divisions. For cartobibliographical details and thumbnail-sized reproductions of maps from the seventeenth-century Dutch atlases mentioned in this chapter, see Peter van der Krogt, *Koeman's Atlantes Neerlandici* ('t Goy-Houten: HES, 1997–).

132. Lubin, *Mercure geographique,* 141.

133. The three settlement ranks were identified from the manuscript in Rome (Urb. Graec. 82) by Joseph Fischer, "Die Stadtzeichen auf den Ptolemäuskarten," *Kartographische und schulgeographische Zeitschrift* 7, pts. 3 and 4 (1918): 49–52. Some of the classical maps in the Florence *Geography* (1482) have triangles and circles for higher and lower orders. A recently rediscovered papyrus map dating from early in the first century B.C. confirms the antiquity of the sort of schematic pictorial place-signs used on the medieval maps for the *Geography;* see Bärbel Kramer, "The Earliest Known Map of Spain (?) and the Geography of Artemidorus of Ephesus on Papyrus," *Imago Mundi* 53 (2001): 115–20.

134. Translated from the Latin by N. Horton Smith and Alessandro Scafi. See Bert van 't Hoff, *De kaarten van de Nederlandsche provinciën in de zestiende eeuw door Jacob van Deventer* (The Hague: Martinus Nijhoff, 1941), map 1. See also Günter Schilder, *Monumenta cartographica Neerlandica* (Alphen aan den Rijn: Canaletto, 1986–), 1:80.



C 1474 Sanudo | W 1475 Brandis | C 1477 Ptolemy/B | C 1482 Ptolemy/F | W 1491 Cusanus | W 1492 Etzlaub

W 1500 Etzlaub | W 1513 Wald/Cr | W 1513 Wald/Lo | W 1513 Wald/Sw | W 1515 Uberti | W 1524 Erlinger

W 1525 Fine | W 1526 Wapowski | W 1528 Lazarus | W 1528 Münster | W 1533 Rotenhan | W 1538 Beke

W 1539 Olaus | C 1540 Mercator | W 1540 Ptolemy/B | W 1542 Zell | W 1543 Anthonisz. | C 1543 Deventer

C 1545 Gastaldi | W 1548 Stumpf | W 1550 Pagano | C 1552 Sophianos | C 1554 Mercator | W 1555 Gastaldi

C 1555/40 Tram/Me | W 1555 Vopel | C 1556 Gastaldi | W 1556 Lazius | C 1557 Ziletti | W 1559 Jordanus

W 1560 Simeoni | W 1561 Helwig | C 1562 Forlani | C 1563 Ligorio | C 1563 Porębski | C 1563 Sgrooten

C 1564 Gastaldi | C 1564 Mercator | C 1566 Forlani | C 1567 Gastaldi | W 1568 Apian | C 1569 Fabricius

C 1570 Gastaldi | C 1570/61 Ortelius/He | W 1571 Campi | C 1571/70 Mell/St | C 1575 Saxton/Ha | C 1577 Saxton/Ch

FIG. 21.23. NUCLEATED SETTLEMENT SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

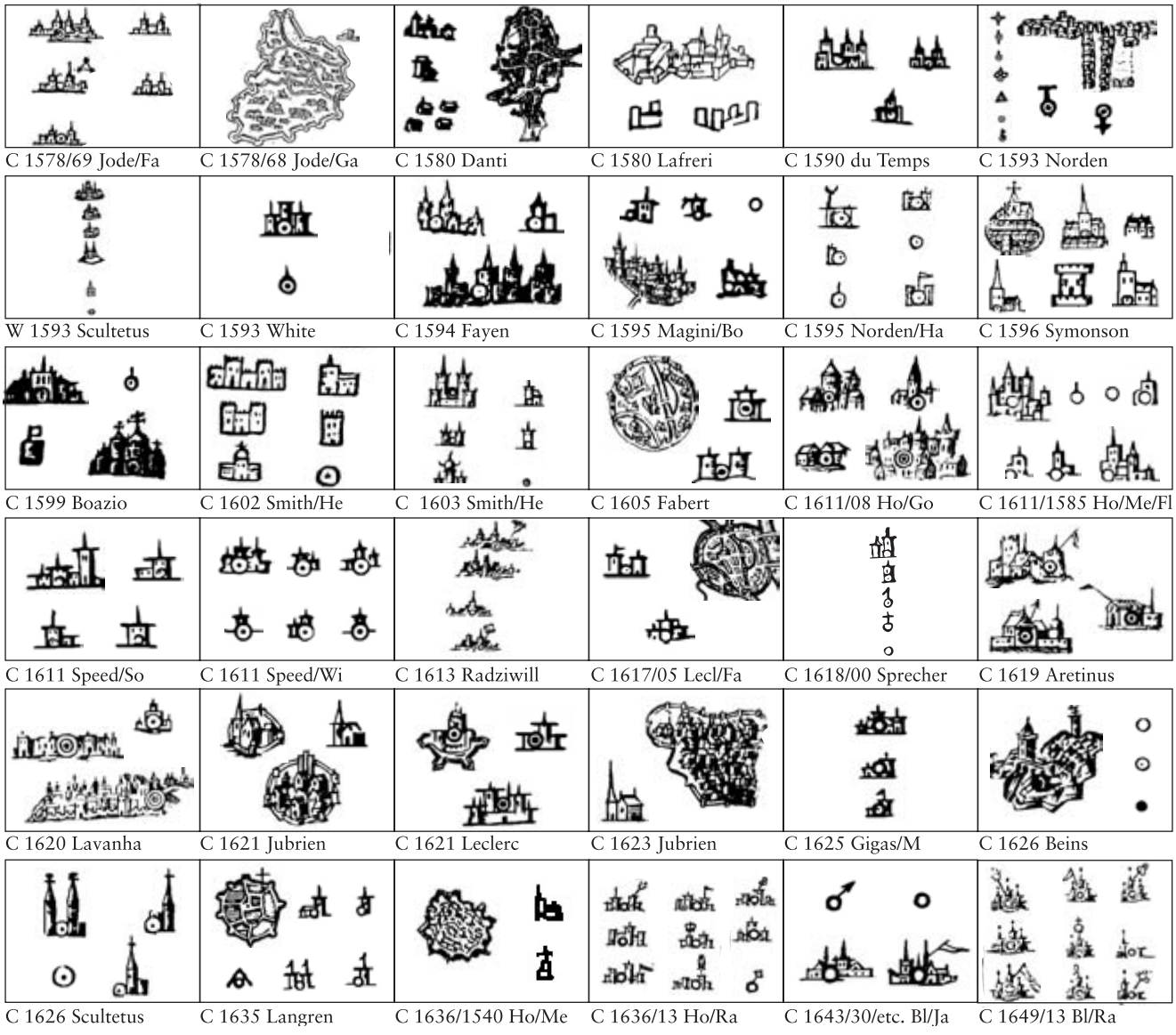


FIG. 21.23. (*continued*)

common toward the end of the period. Some mapmakers added a short line to the settlement sign pointing to the place-name where the relationship might not be obvious. The practice seems to have started early in the sixteenth century (e.g., it was used by Georg Erlinger, 1515), but the most consistent exponent was Mercator, who drew attention to the line in a note to readers in his atlas (1589).

The locational dot varies in composition. It may be a small open circle, a circle containing a point or "prick," or a point alone without the circle. The placing of the locational dot also varies. Most commonly it is incorporated into the pictorial element, but sometimes it is outside, either immediately adjacent or, occasionally, quite separate, as on Johannes Aventinus's map of Bavaria (1523).[135] On Antonio Campi's map of the territory of Cremona (1571) (see fig. 21.23), the point is placed in the center of the arched doorway that is a prominent feature of each settlement sign. Where a small circle was used as the sign itself, the circle also indicated location.

Signs for Nucleated Settlements

The most intricately composed signs on early modern printed topographical maps are the pictorial signs representing nucleated settlements: cities, towns, villages, and hamlets (fig. 21.23). These vary from visually simple, ab-

135. Unusual placings can confuse. On Lazarus's map of Hungary (1528), the locational dot was often placed above rather than below the pictorial element, so the dot appears to serve a different function altogether. An imperfect circle above one sign is liable to be mistaken for one of the Islamic crescents used on the same map to mark places taken by the Turks.

stract signs based on a plain circle—circles of different sizes or concentric circles (usually two or three, sometimes with a central dot)—to detailed pictorial signs. Rarely was a geometrical shape other than a circle used, although Waldseemüller employed rectangles on his map of Lorraine (1513).[136] Up to about 1560, a quarter of the maps sampled have abstract signs only. Later, when it became less common to use abstract signs alone, these continued to be used together with pictorial signs as a way of extending the semiotic vocabulary. Almost inevitably, the smallest or the simplest circle was reserved for the settlements of lowest rank shown on a particular map. At the other end of the visual spectrum are pictorial signs. The use of pictorial signs alone for settlements seems to have been most common during the three decades from 1530 to 1560, from which three-quarters of the maps sampled have no abstract settlement signs.

Pictorial place-signs were adapted in all sorts of ways as individual mapmakers sought ways of increasing the range of their vocabulary. One method was to vary the number of elements (buildings, towers or spires, or walls) composing the sign. Another was to vary the arrangement of these elements, so they may be found neatly aligned or in a group. A third variation is the angle or perspective from which the whole place was represented (see fig. 21.7). Possible permutations are many, but the four main types of Renaissance settlement signs can be summarized as follows:

1. profile settlement signs (where a single building, or at most two or three aligned neatly in a row, is simply outlined);

2. perspective settlement signs (where a group of buildings, each drawn in profile, is irregularly disposed so as to give an illusion of depth);

3. bird's-eye settlement signs (where a group of buildings is portrayed as if from an oblique angle, high or low, so as to give a limited view into the town or city); and

4. plan view or ichnographical settlement signs (where the whole settlement is portrayed as if viewed from directly above).

In general, it is probably fair to say that the first category was always common throughout the period, but that it became the main type of sign on seventeenth-century atlas maps for all but the largest nucleations; that the bird's-eye perspective sign was used mainly from the 1560s onward; and that the true plan view was not used at all until the seventeenth century. As a caveat, though, it has to be said that it is often impossible to tell if any systematic ranking was intended, especially on Italian copperplate maps from the mid-sixteenth century onward.

To the essential information—where a settlement was located and its relative importance—was added a potentially limitless array of details. The additional information was communicated either by adapting the pictorial element to portray the detail in question (the presence of an enclosing wall, for example) or by attaching a cipher to the vignette. Frequently both methods were used together. Additionally, different sizes or styles of lettering used for place-names confirmed the graphic information. On Ortelius's version of La Guillotière's map of the Île-de-France (1598), only the format of a place-name distinguishes it from two similar pictorial signs.[137]

The most prolific of the individual mapmakers of the sixteenth century were not concerned with portraying places realistically, and it was usually those who produced only a limited number of maps who took the greatest pains to give character to the settlements shown on their maps. Porębski's map of the duchy of Oświęcim (map of Auschwitz, 1563) (see fig. 21.23) is outstanding for the way the linear villages (*angerdorf*) of what was at the time recent German colonization were distinguished from green villages (villages arranged around a central space) and from compact nuclei of no clear layout. Other mapmakers selected only the largest centers to portray faithfully, as in the case of Apian's mapping of Bavaria (1568). Partly, no doubt, to show the city of Perugia as realistically as possible, Danti represented it from a high oblique angle, thus revealing the main features of its layout (map of Perugia, 1580).[138] Bartholomäus Scultetus did much the same for the city of Görlitz (map of Upper Lusatia, 1593). In the seventeenth century, it was becoming more common to show major centers in full plan view. In 1635, Michael Florent van Langren marked all Brabant towns in this way. At the same time, there was a growing fashion, especially on the commercial Dutch productions, of adding insets of town plans around the

136. Persian and Arab mapmakers traditionally used a much greater range of geometric signs (plain rectangles, rectangles with one gabled end, small circles, large circles, segmented circles, etc.) for settlements on their regional maps; see, for example, the medieval maps of the Mediterranean region in Yūsuf Kamāl (Youssouf Kamal), *Monumenta cartographica Africae et Aegypti,* 5 vols. (Cairo, 1926–51), 3:587–615, reprinted in 6 vols., ed. Fuat Sezgin (Frankfurt: Institut für Geschichte der Arabisch-Islamischen Wissenschaften an der Johann Wolfgang Goethe-Universität, 1987), 3:170–98.

137. On La Guillotière's map (1598, 1619), the two types of pictorial signs (profile and perspective) are further distinguished by the use of uppercase or lowercase lettering for the place-name, giving a total of four signs.

138. Egnazio Danti modeled his representation of Perugia from his father's survey of the city. In *Le scienze matematiche ridotte in tavole* (Bologna, 1577), Danti refers to "the chorography of the city of Perugia with the surrounding countryside made by my father Giulio Danti where the plan of the whole is drawn . . . after nature, with every street and house, trees, and other things"; see Thomas Frangenberg, "Chorographies of Florence: The Use of City Views and City Plans in the Sixteenth Century," *Imago Mundi* 46 (1994): 41–64, esp. 55, and 64 n. 88 for the Italian text.

map of a region, and the need to show the details of urban layout within the sign itself lessened, thus avoiding, as Fordham noted, "the absurdity of enormously exaggerating the town on the map itself."[139]

Despite all the possibilities available to the early modern mapmaker for creating a full range of settlement signs on every map, the advantage was rarely exploited. The average number of settlement signs on Renaissance printed topographical maps remained constant at between three and four throughout the entire period considered here.[140] Up to the 1580s, the largest number of settlement signs noted on any map in our sample was eight (on Fabricius's map of Moravia of 1569) (see fig. 21.3*b*). Henneberger devised fourteen settlement categories for his map of Prussia (1584) (see fig. 21.3*d*), but this has to be regarded as exceptional. Fabricius and Henneberger helpfully identified their settlement signs in a key, but where no such explanation is provided, the rationale behind the mapmaker's classification is often difficult to ascertain. This has not prevented modern researchers from trying to find a pattern in the signs, some more cautiously than others. Campbell's analysis of settlement signs on the medieval Gough map of England and Wales (ca. 1360) led her to venture that although something recognizable may be discerned in some of the signs for cathedral and walled towns, the same cannot be said for the smaller places. Noting that "the most frequently employed symbol is that of the one-floored dwelling," represented on the map over three hundred times in ten marginally different ways (usually according to the number of doors and windows depicted), she was careful to avoid seeing anything significant in such variations.[141] In contrast, Bird decided, based on his study of John Speed's printed maps of the Welsh counties, that Speed had "built up the composite symbol for each town virtually the same as he saw it from some vantage point," and suggested that Speed systematically deployed differently sized towers to represent the real relationship of church, castle, and that he sometimes added a third dominant building, such as a monastery, "for depicting . . . his judgement of the status of the towns as he saw them."[142]

Late twentieth-century critical theory encouraged other historians of cartography to read an ideological significance into settlement signs. The order in which the signs are explained or not explained in the key is seen as significant. The keys do raise questions, it is true. One wonders why Mercator explained only the four ecclesiastical signs on his map of Europe (1554) and not the four or five ranks of nucleated settlements also distinguished, why castles were placed first in the key on Sebastian von Rotenhan's map of Franconia (1533), and why "a Bishopes towne"—the central place of Irish bishoprics—heads Boazio's key (1599).[143] The answers, however, surely lie in the circumstances of and reasons for each map's creation. On John Norden's and William Smith's maps of the counties of England, made for general sale, the listing seems logical, not necessarily politically sinister. The largest unit, the market town, comes first in the key, followed by the other essentially secular places, in descending order according to population size and extent of built-up area: parishes (meaning villages and hamlets), royal country houses (castles, noblemen's houses, gentlemen's houses), religious places (notably monasteries), and industrial features (mills).

A point was made of indicating walled towns on the early modern printed topographical maps, especially on the continent of Europe. For travelers as well as for those citizens who left town each morning to cultivate the surrounding fields, the closing of the town gates at nightfall was of critical importance.[144] Walls can be easily shown in a pictorial sign: Scultetus (1593), for example, simply added a schematic band to the base of his pictorial sign for walled towns and cities (see fig. 21.23). Other mapmakers coded the pictorial element. Henneberger (1584) transformed the locational dot into a large black dot within a circle to indicate a "Town or City with surrounding walls." Places defended by a castle were also singled out, again especially on Continental maps.[145] Martin Helwig (1561), and Paul Fabricius (1569) after

139. Fordham, *Maps,* 49. In England, Norden included the county town of Chichester on his map of Sussex in 1595.

140. A sample of 160 maps was used in the calculation of the average number of settlement ranks, but on a quarter of these (24 percent) the rankings were insufficiently distinct (if any were intended) for analysis.

141. Campbell, "History of Cartographical Symbols," 179. Campbell's analysis of settlement signs on Philip Symonson's map of Kent (1596) resulted in no firmer a conclusion. The historical reliability of signs showing a church with a spire rather than a tower needs documentary or physical confirmation in each instance.

142. Alfred John Bird, "John Speed's View of the Urban Hierarchy in Wales in the Early Seventeenth Century," *Studia Celtica* 10–11 (1975–76): 401–11, esp. 407 and 404.

143. Harley commented, "Not only do these maps heighten the perception of the power of the church as an institution within society as a whole, but they also record the spatial hierarchies and conflicting denominations within the church itself"; see Harley, "Maps, Knowledge, and Power," 70 (on Boazio also, see p. 70). Harley suggested (after the present author) that Norden's omission of "Bishop's Sees" from his maps of the English counties was a direct function of Norden's fervent anti-Catholic bias; see J. B. Harley, "Silences and Secrecy: The Hidden Agenda of Cartography in Early Modern Europe," *Imago Mundi* 40 (1988): 57–76, esp. 67 (fig. 4) and 75 n. 84. However, on Boazio and Norden's mapping of places with "castles" and former monastic sites, see J. H. Andrews, "John Norden's Maps of Ireland," *Proceedings of the Royal Irish Academy* 100, sect. C (2000): 159–206, esp. 181.

144. Noël de Berlemont, *Colloquia et dictionariolum septem linguarum, Belgicæ, Anglicæ, Teutonicæ, Latinæ, Italicæ, Hispanicæ, Gallicæ* (Antwerp: Apud Ioachimum Trognæsium, 1586).

145. It has been estimated that there were probably between 75,000 and 100,000 castles in medieval western Europe (14,000 are listed for the German-speaking territories alone), and the figure would not have been substantially different in the Renaissance; see M. W. Thompson, *The Decline of the Castle* (Cambridge: Cambridge University Press, 1987), 4. There are thought to have been 1700 castles in England and Wales.

him, arranged three dots into a triangle as the *signe annexe* for the sign for a town or village with a citadel. Paulus Aretinus (von Ehrenfeld) added a feathered arrow to the pictorial sign to indicate a *castellium* (fortified settlement) and a pennanted lance to indicate a settlement protected by an *arx* (citadel) (1619).[146] In the seventeenth century, a fort might be shown in full plan view when the settlement remained in high oblique, as on Fabert's map of the diocese of Metz (1605).

Modern map users do not expect to find urban centers categorized by function on a general topographical map, but in early modern times certain economic aspects were worth drawing attention to. The privilege of a charter allowing a regular market not only could make all the difference between a settlement's decline or success, but was also the sort of information that contemporaries were advised "to bear in mind" in order to know "what travelling, [and] dispatching of messengers . . . requires."[147] The presence of a market was regularly signaled either by a specific pictorial sign for a market town or by an additional sign or code. Claudianus used a reversed capital "C" (map of Bohemia, 1518), Apian a circle with a cross bar (map of Bavaria, 1568), and Fabricius three dots over a plain circle (map of Moravia, 1569). When Münster supplied the key for his copy of Claudianus's map in the 1545 edition of his *Cosmography,* he correctly identified the reversed "C" as *Ein marckt* (a market), but labeled it as *Oppidum non muratum* (unwalled town) on the same map in his edition of Ptolemy's *Geography,* published the same year.[148] Norden, who always preferred abstract signs, usually represented market towns by a circle with four outward-pointing spokes around the rim.[149] When he did use a stylized pictorial sign for his map of Hampshire (1595), he placed a small upturned semicircle on a church spire, a sign with which his English readers were doubtless familiar but one that Continental readers, especially in Ottoman-dominated Europe, could have mistaken for an Islamic crescent.

Virtually no attempt was made to portray vernacular styles in pictorial settlement signs. Waldseemüller depicted troglodytic dwellings in Crete (1513), labeling them for clarity, and the Corfiote Nikolaos Sophianos indicated the minarets of the occupying Turks' mosques in Greece (1552). A hint of the bulbous church spires typical of Moravia may be discerned in Fabricius's signs (1569), as can a hint of the flat and domed roofs of Palestine on the map of the Holy Land by Christiaan van Adrichem (Christianus Adrichomius) (1593). In general, though, the architectural styles of western Europe predominate irrespective of the region portrayed.[150]

Signs for Isolated Settlements

Ptolemy listed only major population centers. Renaissance mapmakers included not only villages, but also certain categories of isolated settlement. In general, what was shown reflects the historical geography of the different countries of Europe. In England and Wales, the decline of feudalism and the sharp increase of land availability after Henry VIII's liquidation of the monasteries from the late 1530s onward led to major changes in the rural landscape as well as the nation's social structure. The influx of wealth from the New World also contributed to the ability of gentry and nobility alike to occupy isolated country mansions set in the extensive parks portrayed by mapmakers such as Saxton, Norden, Smith, and Speed. Saxton showed the park alone, but as the prosperity of the final decades of the century began to be reflected in the "Great Rebuilding" of older manor houses, his successors included the house in the park sign.[151] The latter was indicated as a subcircular enclosure delineated by post-and-rail fencing, but the signs varied considerably in their details (fig. 21.24). On Saxton's maps, enclosures may have both upper and lower rails or one rail only with the posts, rails and no posts, or posts and no rails.[152] Unlike

146. Ortelius kept Helwig's codes on his version of the map in the *Theatrum* (1570). The bilingual labels (German and Czech) in Fabricius's key are transcribed and translated by Kuchař, in *Early Maps of Bohemia,* 36, as "fortified town," "town," "small manorial town" (with a market), "village and castle or fortress," "castle," "monastery," and "village."

147. Quotation from Martin Helwig, *Erklärung der Schlesischen Mappen* (1564), translated by Kuchař, *Early Maps of Bohemia,* 50.

148. Sebastian Münster, *Cosmographia,* 2d ed. (Basel, 1545), no. xvii, and Claudius Ptolemy, *Geographia universalis* (Basel, 1545), no. 45. I am grateful to Ruthardt Oehme for his help with Münster's explanation of Claudianus's signs.

149. On Norden's manuscript maps of Cornwall, however, market towns are represented pictorially, by four buildings forming a square around a church. For a facsimile of the maps, see John Norden, *John Norden's Manuscript Maps of Cornwall and Its Nine Hundreds,* ed. and intro. W. L. D. Ravenhill (Exeter: University of Exeter, 1972). Norden provided a key to his signs in his written account; see the first printed edition of his text, *Speculi Britanniæ Pars: A Topographical and Historical Description of Cornwall* (London: Printed by William Pearson for the editor, and sold by Christopher Bateman, 1728), facing sig. Aa. The key has been omitted from the modern facsimile of Bateman's edition; see John Norden, *Speculi Britanniæ Pars: A Topographical and Historical Description of Cornwall* (Newcastle-upon-Tyne: Frank Graham, 1966).

150. Johnson, in *Carta marina,* 71, notes that on Lorenz Fries's version of Waldseemüller's world map (1525) "towns have walls, turrets, and gates, and are small versions of Alsatian cities, be they in the African kingdoms of Melli and Ethiopia, or in Calicut and Murfuli in southern Asia. . . . Of towns everywhere only Mecca does not have a western European look."

151. The phrase "Great Rebuilding" is W. G. Hoskins's; see his *Provincial England: Essays in Social and Economic History* (London: Macmillan, 1963), 131–480.

152. The sign can be regarded as traditional, derived from signs used on medieval manuscript maps, or simply as mimetic. Parks are shown, for example, on the map of Sherwood Forest (ca. 1430); see M. W. Barley, "Sherwood Forest, Nottinghamshire, Late 14th or Early 15th Century," in *Local Maps and Plans from Medieval England,* ed. R. A. Skelton and P. D. A. Harvey (Oxford: Clarendon, 1986), 131–39, esp. 132 (pl. 10).

Isolated Settlements

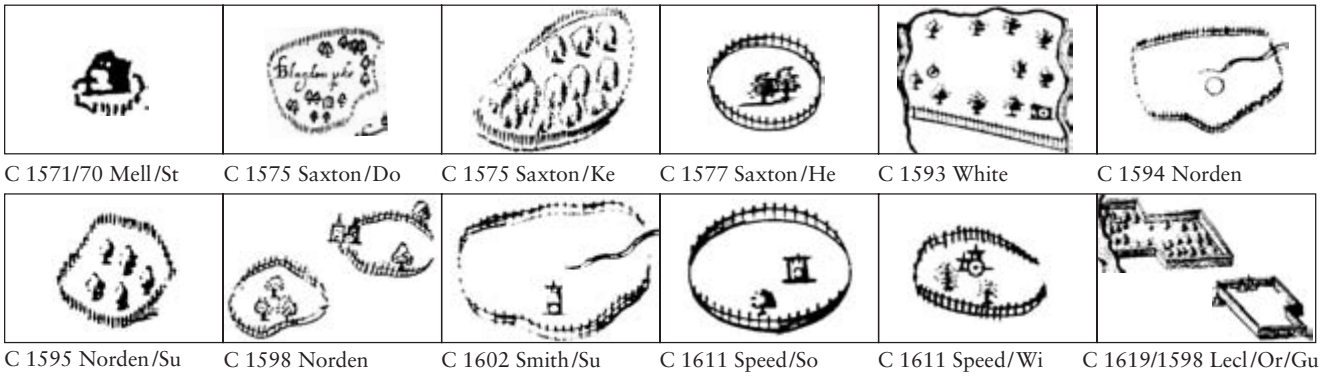


FIG. 21.24. ISOLATED SETTLEMENT SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

Saxton, Norden identified parks belonging to the crown by means of a fleur-de-lis superimposed on the house.[153] He also took pains to identify several ranks of country houses, from "ordinary houses of name" to "houses of best receipt" (map of Hampshire, 1595) and from "Houses of Nobility," "houses of Knights, Gentlemen, etc." to "Houses and Palaces of Queen Elizabeth" (map of Middlesex, 1593). William Smith, although by profession a herald who might have been expected to be interested in the niceties of social rank, only sometimes differentiated "houses and manners [manors] of Queen Eliz[abeth]" or "Houses and manners of the king" (map of Surrey, [1602–3]) from "Gentlemens houses" (map of Hertfordshire, 1602) or "houses of name" (map of Essex, 1602). Both Norden and Smith explained their signs in a key.

The country house set in parkland was a peculiarly English phenomenon.[154] On the Continent, where castles and fortresses betokened the enduring grip of feudalism or city-state politics and even where these had been transformed from obviously military into more palatial structures, nothing like the English country house is found on maps, apart from Stella's signaling of "Nobleman's houses" on a map of Mansfeld (drawn in 1561). Stella's map was engraved in 1570 when Frans Hogenberg adapted the usual stylized settlement sign (a location dot flanked by buildings) by giving the structure an upswept roof. Two royal parks with their châteaus are portrayed prominently on La Guillotière's map of the Île-de-France (1598): Vincennes and Madrid. The latter, today only a name in the Bois de Boulogne, had been built in 1525 by François I.[155]

The humbler dwellings of the peasantry were not normally featured on printed regional maps. For some reason, though, Johannes Mellinger changed some of Tilemann Stella's village signs to show *Scheferty* (shepherd huts) on his version (1571) of Stella's map of the county of Mansfeld (1570) (see fig. 21.24), explaining the sign in the key. Ortelius reused Stella's copperplate for the map in the *Theatrum* (1573/70), so neither Mellenger's sign nor his key was shown.

Signs for Monasteries

In continental Europe, monasteries remained important centers of population and economic activity in rural areas as well as towns throughout the early modern period and were usually marked on maps as a separate category of settlement (fig. 21.25).[156] Some mapmakers added a cipher to the usual settlement sign. In 1538, Pieter van der Beke (followed by Mercator in 1540) used letters to distinguish abbeys from prebends and establishments for men from those for women (*A.M., P.M., A.F., P.F.*) on his map of Flanders. Likewise, Danti used a crosier (for monasteries belonging to episcopal orders) or a Maltese cross (for those belonging to military orders) on his map of the district of Perugia (1580), placing the monastic sign either close by or in the middle of the relevant settlement or in isolation in the countryside, as the case demanded. Johannes Michael Gigas (Gigantes), on his map of the diocese of Münster (1625), identified the specific order by placing an abbreviated form of the name of the order beside the general settlement sign (e.g., *Or. Ben* for *Ordo Benedictus*).

Signs for Deserted Villages

The decline of hamlets and villages—or, as was so often the case, their depopulation—through the enclosure of

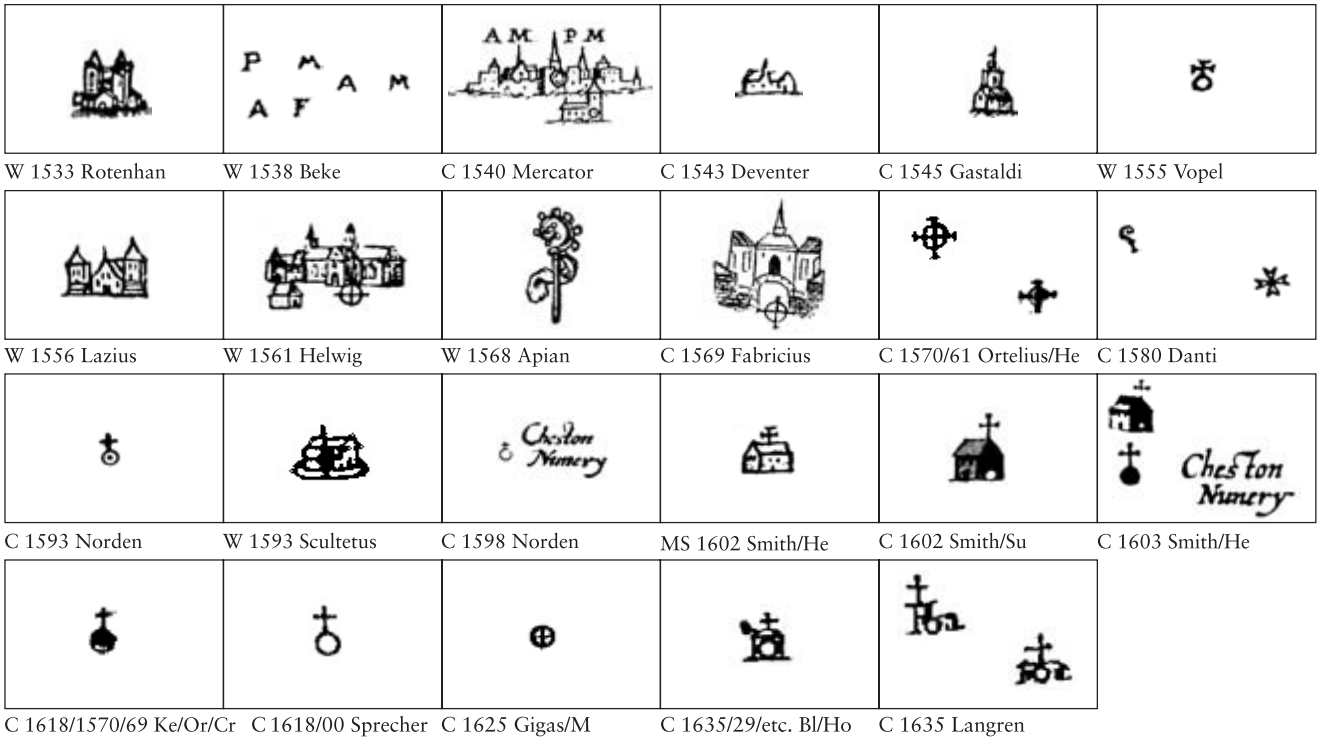
153. Norden's description in the key of the maps of Middlesex (1593) and Surrey (1594) reads "houses of the Queen." The wording had to be altered after 1603 to "houses of the King" (e.g., versions engraved by William Kip for William Camden's *Britannia,* 1607).

154. As Dainville also noted, *Langage des géographes,* 325.

155. The château of Madrid, the site of which is now in the Bois de Boulogne, Paris, had been built by François I after the battle of Pavia (1525) and was said to have been named as a reminder of his captivity in Madrid, Spain. The Château de Vincennes was a royal residence from the thirteenth to the eighteenth century.

156. Monasteries were noted on about a quarter of maps examined.

Monasteries



W 1533 Rotenhan | W 1538 Beke | C 1540 Mercator | C 1543 Deventer | C 1545 Gastaldi | W 1555 Vopel

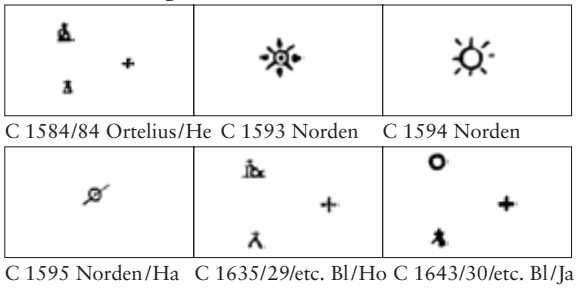
W 1556 Lazius | W 1561 Helwig | W 1568 Apian | C 1569 Fabricius | C 1570/61 Ortelius/He | C 1580 Danti

C 1593 Norden | W 1593 Scultetus | C 1598 Norden | MS 1602 Smith/He | C 1602 Smith/Su | C 1603 Smith/He

C 1618/1570/69 Ke/Or/Cr | C 1618/00 Sprecher | C 1625 Gigas/M | C 1635/29/etc. Bl/Ho | C 1635 Langren

FIG. 21.25. MONASTERY SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

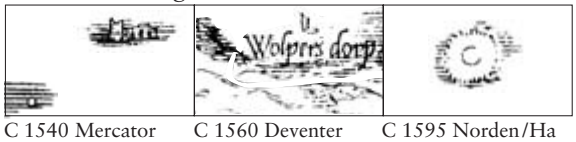
Deserted Villages



C 1584/84 Ortelius/He | C 1593 Norden | C 1594 Norden

C 1595 Norden/Ha | C 1635/29/etc. Bl/Ho | C 1643/30/etc. Bl/Ja

Drowned Villages



C 1540 Mercator | C 1560 Deventer | C 1595 Norden/Ha

FIG. 21.26. DESERTED VILLAGE SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

common fields and the replacement of arable land by pasture was a widely felt social injustice throughout Renaissance Europe.[157] In England and Wales, a long-term problem was exacerbated in the late sixteenth century by the removal or elimination of villages as a result of the landscaping of private parks and the rebuilding of country houses. Stella (1571/70) indicated lost villages (*wusterdorff*) with a ghost version of the usual pictorial sign for a village or town. On his map of Prussia (1584), Henneberger identified three different categories of deserted settlement (fig. 21.26): *parochia devastate* (villages laid waste), *mons arcis vastate* (abandoned hilltop citadels), and *locus ubi olim dimicatum est* (reduced places).[158] Henneberger's nonpictorial signs were retained more or less unchanged on the versions of his map published by Ortelius, Blaeu, and Janssonius. In England, Norden showed "decayed places" on the three maps published in his lifetime (his maps of Middlesex, 1593; Surrey, 1594; and Hampshire, 1595), using abstract signs in each case. On the map of Hampshire he also recorded "places sometime monasticall," using a circle surmounted by a cross.

Drowned villages are also featured on some early modern printed topographical maps. On Mercator's map of Flanders (1540), villages drowned in the floods of 1523 are indicated by faintly marked village signs in the middle of the waters. In England, where many villages and some

157. For a comprehensive if somewhat dated overview, see the regional essays in *Villages désertés et histoire économique, XI^e–XVIII^e siècle* (Paris: S.E.V.P.E.N., 1965). For England and Wales, see M. W. Beresford and John G. Hurst, eds., *Deserted Medieval Villages* (London: Lutterworth Press, 1971).

158. My slightly free translation underlines the way Henneberger's distinction between fully deserted sites and reduced sites corresponds to current practice in historical geography and archaeology.

towns had been lost to the sea since the Middle Ages, including the town of Dunwich, Suffolk, only the village of Broomhill, Sussex—engulfed by the waves in 1287—was singled out by Norden (1596).[159] Norden's abstract sign was logical: an open circle cancelled by placing a line through it.

SIGNS FOR ECCLESIASTICAL ASPECTS OF LIFE

It would have been difficult to ignore, in early modern Europe, the administrative hierarchy of church and state. Each settlement owed allegiance to one or the other as overlord, and taxes were due to both. The church of Rome was in theory subject to the crown, but by the Renaissance the papal patrimony had become virtually autonomous, its hegemony broken, albeit, by the Reformation. Much of northern and northwestern Europe had become Protestant by the middle of the sixteenth century, and in 1534 the English king, Henry VIII, severed relations with Rome to become head of a Protestant Church of England. Many mapmakers and printers held strong religious convictions, often (like Mercator) at considerable personal risk. Unsurprisingly, however, few of these personal beliefs were betrayed on the maps of the period.

Confessional Signs

Despite an acute interest in matters of confession during and after the Reformation, only a few mapmakers showed confessional allegiance on their maps (fig. 21.27). In 1518, Claudianus, who was a leading member of the Unity of Bohemian Brotherhood, used one kind of pictorial sign to identify places in Bohemia where the Ultraquist (Hussite) rites were followed and another kind for places adhering to Rome (a chalice and the crossed keys of Saint Peter, respectively) on a map that was almost certainly made for a specific purpose and not as a general map of the country. On Lazarus's map of Hungary (1528), some place signs have a truncated spire, as if a confessional distinction was being indicated. On other maps, pictorial signs depicting the different styles of headgear worn by bishops were used to distinguish confessions. On Bernard Wapowski's map of Poland (1526) and Radziwill's map of Lithuania (1613), places under Catholic jurisdiction are distinguished from those under Orthodox Church authority in this way.

Church Status Signs

Less contentious than confession was the status of the main church in each settlement. Ecclesiastical rank is the third most commonly indicated aspect of a settlement (after secular rank and location) and is signaled on well over half of the maps in the sample (fig. 21.28). Various de-

Confessional Allegiance

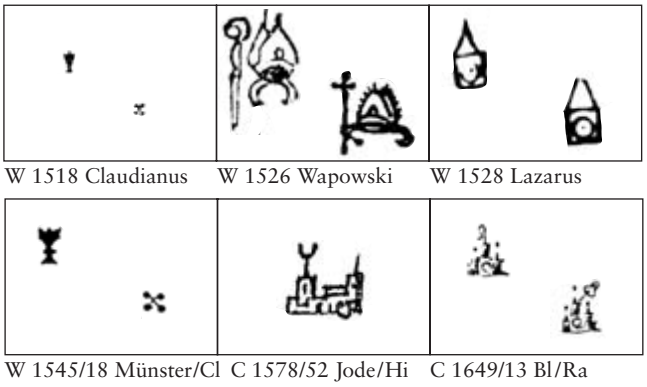


FIG. 21.27. CONFESSIONAL SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

vices were used—Erlinger capitalized the first letter of the place-name of bishoprics (map of the Holy Roman Empire, 1515), for instance—but by far the most common system was to use a special pictorial sign or cipher. Pictorial signs tend to feature a church (with spire or tower), with buildings on one or both sides, like those used by Oronce Fine, who also explained which sign stood for archbishoprics and which for bishoprics in the key on his map of France (1525). A common form of coding was a double cross to indicate archbishoprics and a single cross (or, as on Gastaldi's maps, a crosier) to indicate bishoprics.[160] There was little consistency in precisely which form of cross was used or how the signs were placed. On Mercator's map of England and Wales (1564), the crosses sometimes hang from the bottom of the pictorial sign instead of standing upright above it, and the same type of cross was used indifferently for the Catholic churches of southern Europe, the Orthodox churches of Greece and the Balkans, and the Protestant churches of northern Europe and England and Wales (1554). Mercator added two other crosses to his map of Europe (1554), one to signal the seat of the pope (*pontifex Romanus*) in Rome, and the other to indicate the patriarchal sees.[161] On the single oc-

159. The town of Broomhill, Sussex, formerly located between Old Winchelsea and Rye, was lost when the Rother River changed course in the storms of February 1287. The townsmen of the once flourishing channel port of Winchelsea finally were obliged to agree to move to a new site; see M. W. Beresford, *New Towns of the Middle Ages: Town Plantation in England, Wales, and Gascony* (1967; reprinted Wolfboro, N.H.: A. Sutton, 1988), 15.

160. Dainville, in *Langage des géographes,* 222, suggests that Protestant and Catholic archbishoprics and bishoprics were differentiated by the absence of the top piece of the cross on the latter, but the maps from which his examples were taken are not identified, and I have not noticed any such signs on Renaissance maps.

161. The four patriarchal sees were Antioch, Alexandria, Constantinople, and Jerusalem. The four types of crosses used on the map, but none of the other signs, are identified in a brief key.

Church Status

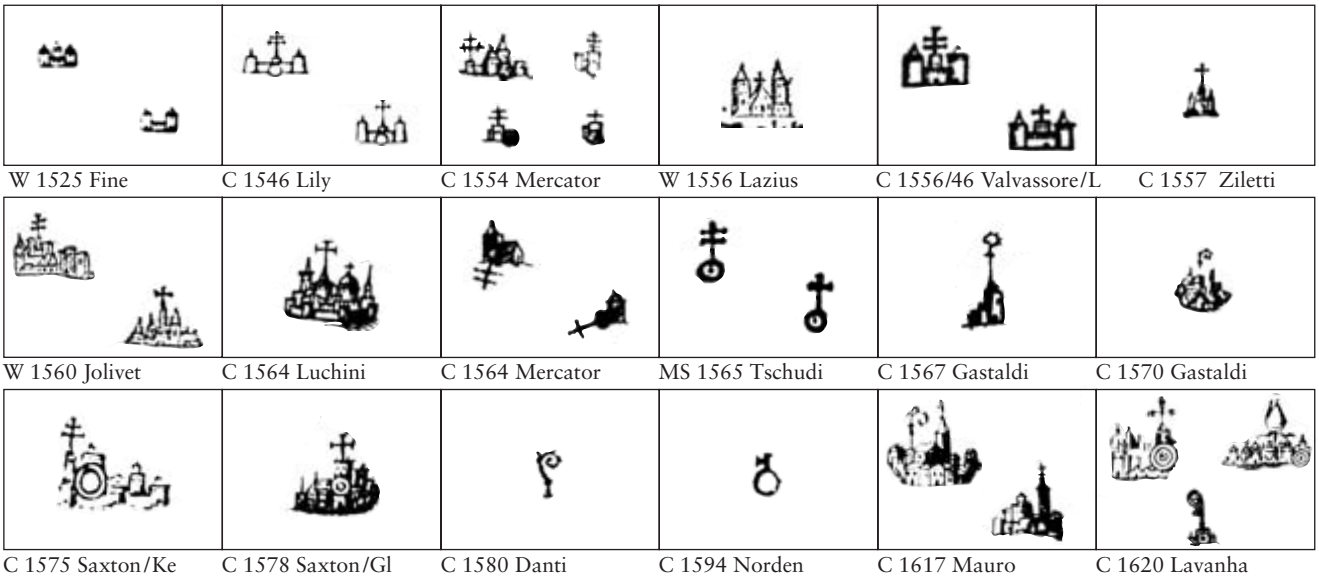


FIG. 21.28. CHURCH STATUS SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

casion on which the fervently Calvinist Norden referred to bishoprics on his county maps (map of Middlesex, 1593), the sign appears only in the key and not elsewhere on the map in connection with any place. In contrast, he marked not only "parishes" (meaning places with a parish church) on all his maps, but also—and uniquely—chapels-of-ease (see fig. 21.28) on all but one of his maps.[162]

LEGAL SIGNS

The issue of lordship could be of major importance, especially on the continent of Europe. The religious and political upheavals of the period may have heightened sentiments about hereditary as opposed to newly acquired social rank, as is sometimes suggested, but the fact remained that tenurial and other dues had to be paid to an overlord. Mercator apologized for omitting such information from the maps in his atlas—"One thing I had very much wanted to do has not been possible, an exact enumeration and designation of the seats of princes and nobles"—and suggested that his readers supply the missing information for themselves, but other mapmakers of the period included such information.[163]

Signs for Territorial Overlords and Urban Overlords

Tenurial signs could be deployed to indicate the overlordship of an entire region, or they could be made specific to each settlement (fig. 21.29). They were rarely explained, the assumption being, no doubt, that the heraldic devices would be recognized.[164] A sign applying to a whole district needed to be bold in design, preferably large, and placed in a prominent position close to the center of the area to which it related. Normal practice was to use a crown to indicate places under the direct control of king or emperor, personal insignia to identify individual baronial lordships, and miters or crosiers to indicate an ecclesiastical overlord. Thus, in 1515, Jacques Signot (Sigault) placed the papal sign of the crossed keys over Rome, the Medici fleur-de-lis over Florence, and banners over Genoa and Venice on his map of Italy. Exceptionally, Claudianus used small crowns and plain escutcheons on their own, without any sign for the relevant settlement, to identify the thirty-seven imperial and fifty-three baronial settlements of Bohemia (1518).[165] Parenti also provided

162. Of Norden's seven county maps for which either the manuscript draft or the early printed version survives, only the maps of Middlesex (1593) and Hertfordshire (1598) omit "chapels" or, as they are specifically called on the map of Hampshire (1596), "chapels-of-ease."

163. The English translation of the Latin of 1595, "[If] you will yourself deign to assist in calibrating the political order of nobility, by indicating the places of this kind, their sites, names and rank, the credit for this will go to you," is taken from Gerardus Mercator, *Atlas; or, A Geographicke Description of the Regions, Countries, and Kingdomes of the World, through Europe, Asia, Africa, and America,* 2 vols., trans. Henry Hexham (Amsterdam: Henry Hondius and Iohn Iohnson, 1636), vol. 2, "An Advise for the Use of Maps," in the preliminaries to the section on France.

164. Waldseemüller identified each sign on his map of the world (1507) in an accompanying booklet; see Delano-Smith, "Cartographic Signs," 14, and, for a translation of the full text, see 24.

165. Data for Claudianus's map are from Kucař, *Early Maps of Bohemia,* 11–15. Claudianus is one of the few Renaissance mapmakers to use no sign at all for the settlement itself, which is subsumed by the sign for the attributes mapped, namely tenure, confession, and the presence of a market or castle. Strictly speaking, Claudianus's map is an early example of a thematic map.

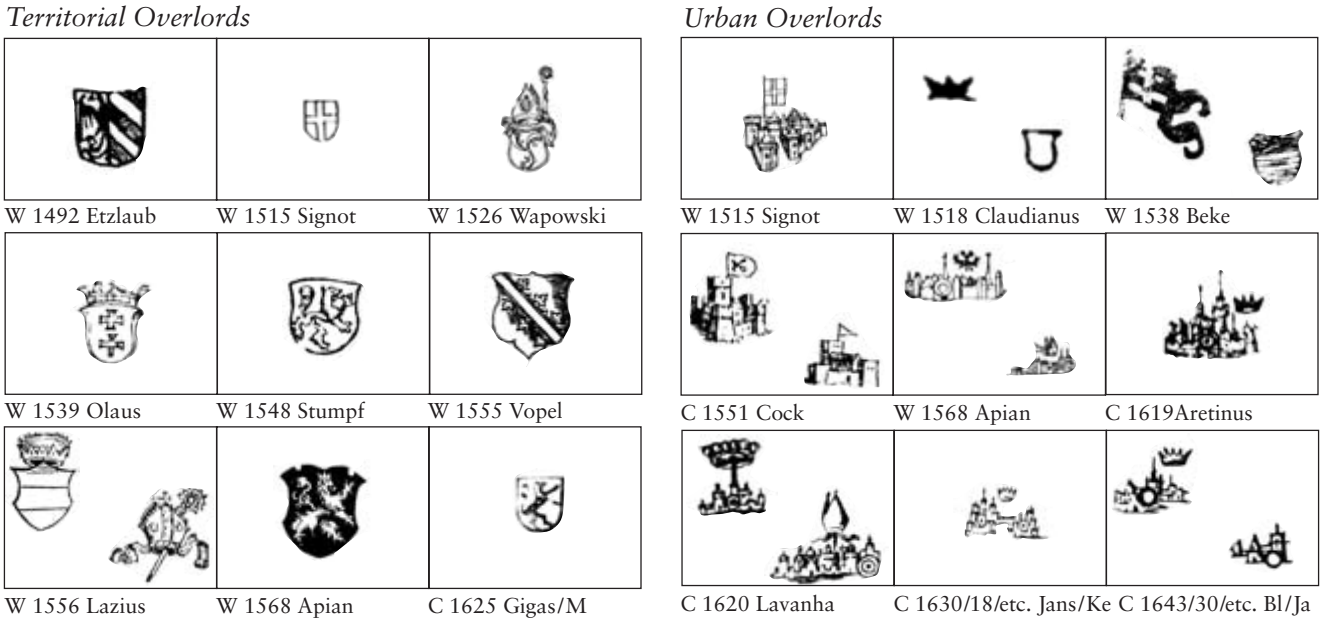


FIG. 21.29. TERRITORIAL OVERLORD AND URBAN OVERLORD SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

the information in a slightly different way, in a classified list with subheadings, printed in an inset, naming in alphabetical order all the relevant settlements shown on his map of Spoleto (1597). Van der Beke's long pennants and large escutcheons (map of Flanders, 1538) were intentionally eye-catching, as he sought to impress the relevant powers, but nearly a century later, the crowns and miters used by Lavanha on his map of Aragon (1620) were scarcely more modest than Van der Beke's.

Signs for Gallows

A highly public aspect of the administration of justice in Renaissance Europe was the roadside gallows, which were habitually placed, often in groups, at the boundary of a territory (fig. 21.30). Sebastian Münster showed two types of gallows on his map of the district around Heidelberg (1528). One of Apian's two signs resembles one used by Münster; the other (labeled *galach*) portrays a structure with three supporting posts (map of Bavaria, 1568). According to Dainville, the number of supporting posts indicated the status of the local court of law: high court justice was represented by two posts, while the gallows of baronial and ducal courts could have from three to eight posts.[166] However, no sign with more than four posts was recorded for the maps sampled for this chapter.[167]

Signs for Seats of Parliament

Signs were also used to indicate selected aspects of government (fig. 21.31). Jolivet described the sign he used to indicate places where the French provincial parliaments

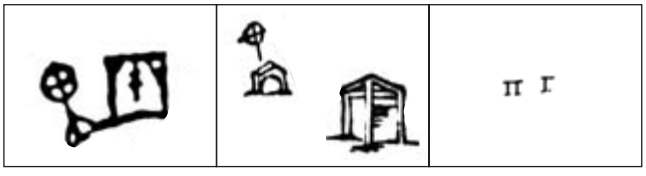


FIG. 21.30. GALLOWS SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

of the ancien régime met as an Islamic crescent (map of France, 1560), but the reasoning behind his selection of such a sign is unclear.[168] Dainville shows that the sign continued to be used on post-Renaissance maps to indi-

166. Dainville seems to have paid particular attention to this group of signs, although he had relatively little to say about examples from before 1640; see François de Dainville, "Le signe de 'justice' dans les cartes anciennes," *Revue Historique de Droit Français et Étranger,* 4th ser., 34 (1956): 111–14, and idem, *Langage des géographes,* 301–2. William Smith indicated a simple two-post structure outside the city bar at Chester in his meticulously detailed manuscript plan of the city, dated 1580, which illustrates his "Description of the County Palatine of Chester" of about 1585 (Oxford, Bodleian Library: the text is Rawlinson MS. 282; the city plan and view and the map of Cheshire are now Rawlinson MS. 282*, fol. 3).

167. When, in 1585, William Smith included a gallows sign on his manuscript plan of the city of Chester (outside the gates at Boughton), he depicted a simple structure like Münster's, but without a hanging figure; see "A Description of the County Pallatine of Chester," Oxford, Bodleian Library, Rawlinson MS. B. 282, fol. 2.

168. Jolivet's key or "Advertissement," given in a cartouche on the maps, reads: "In order easily to know the provinces and the capitals that

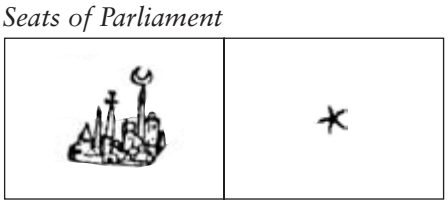


FIG. 21.31. SIGNS FOR SEATS OF PARLIAMENT. See appendix 21.1 for details of the maps from which the signs are taken.

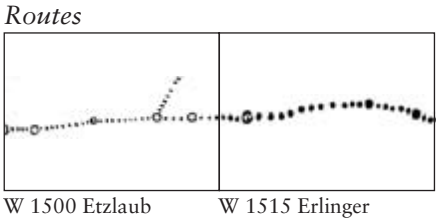


FIG. 21.32. ROUTE SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

cate one government level or another.[169] For his copy of Stella's map of Mansfeld (1571), Mellinger used an asterisk instead.

SIGNS FOR TRANSPORT AND COMMUNICATION

As Dainville noted, opening his discussion of road signs, roads were in fact rarely shown on early modern maps.[170] Maps were not normally used for wayfinding before 1800, and were only just coming into regular use in the Renaissance as way-planning aids.[171] Roads in particular would not have been considered essential information on general maps, or even on maps likely to be used in a military context. Those who traveled regularly in the course of their employment or duties would have been instructed by the body or institution on whose behalf they were making the journey, and they would have been supplied with an itinerary. In view of the unimportance of maps as travel aids, the variety of details relating to travel found on over half the printed maps examined is perhaps unexpected until it is appreciated that the majority of features recorded here were featured only occasionally and by relatively few mapmakers. Printed topographical maps were directed, in the Renaissance, mainly at the general map reader, not at regular or professional travelers.

Signs for Routes

Routes were marked on fewer than ten of the maps listed in appendix 21.1.[172] The typical sign is a series of dots spaced more or less evenly to represent a unit of linear measure (fig. 21.32), as Etzlaub explained in 1500 regarding his *Rom Weg* map: "The road [*weg*] to Rome through German country is drawn with small dots each of which stands for a common German mile. In this way the road [*weg*] is shown in mile-dots from Krakow, Danzig, Rostock, Ribe, Lübeck, Bremen, Utrecht, Nieuport and Marburg—in each case the nearest and best route [*weg*] to Rome."[173] Waldseemüller also included a number of routes on his *Carta itineraria Europae* (1511), a map that, as both its title and the accompanying booklet make clear, was expected to serve for route-planning.[174] On Claudianus's map of Bohemia, the printed dots are painted over to form a yellow-brown line. When Münster reproduced Claudianus's map in 1545, he omitted both dots and line.[175]

Signs for Roads

Unlike routes, roads are tangible and visible on the ground. They form a hierarchical network incorporating

have been anciently parliaments; and the Archbishoprics, Bishoprics, towns, mountains, and rivers; you will be able to see each one written in its place, parliaments having the crescent of Mecca, the Archbishoprics a double cross, the Bishoprics a plain cross; which will suffice to make this information clear to you." I am grateful to Catherine Hofmann for help with the transcription from the original in Paris. François de Dainville, in "Jean Jolivet's 'Description des Gaules,'" *Imago Mundi* 18 (1964): 45–52, has nothing to say about any of the signs.

169. Dainville, *Langage des géographes,* 299. Norden used an identical sign for the market towns of Hampshire (1596).

170. "A most remarkable fact attracts attention: up to the end of the 17th century, few maps show the courses of roads": Dainville, *Langage des géographes,* 261.

171. See Delano-Smith and Kain, *English Maps,* 142–78, and Catherine Delano-Smith, "Milieus of Mobility: Itineraries, Road Maps, and Route Maps," in *Cartographies of Travel and Navigation,* ed. James R. Akerman (Chicago: University of Chicago Press, 2006), 16–68.

172. The distinction between an abstract route and the physical road is crucial to understanding the role of maps in early travel. The two terms, although indexed separately, are described together, with the words used interchangeably, in Wallis and Robinson, *Cartographical Innovations,* 63–64. This is true in most of the literature on maps and travel; see, however, Delano-Smith and Kain, *English Maps,* 142–78, and Delano-Smith, "Milieus of Mobility."

173. The translation is from Herbert Krüger, "Erhard Etzlaub's *Romweg* Map and its Dating in the Holy Year of 1500," *Imago Mundi* 8 (1951): 17–26, esp. 22. Note Krüger's translation of *weg* indifferently as "road" (for which Etzlaub uses, on his 1501 map of roads, *lantstrassen*) and as "route," mirroring the general terminological confusion; a better translation would be "way." See also Dainville, *Langage des géographes,* 259–60, on the French words *voie, route,* and *chemin,* only the last of which indicates a "road." The German text of the explanatory note headed "Register" is given in full in Herbert Krüger, "Des Nürnberger Meisters Erhard Etzlaub älteste Straßenkarten von Deutschland," *Jahrbuch für fränkische Landesforschung* 18 (1958): 1–286, esp. 17–18.

174. The meaning of the word *itineraria* is explained in the accompanying booklet: "First . . . this itinerary map is given to see how far away the different places are from each other" (translation from Delano-Smith, "Cartographic Signs," 24–25).

175. Kuchař, *Early Maps of Bohemia,* pl. 1a–b.

Roads

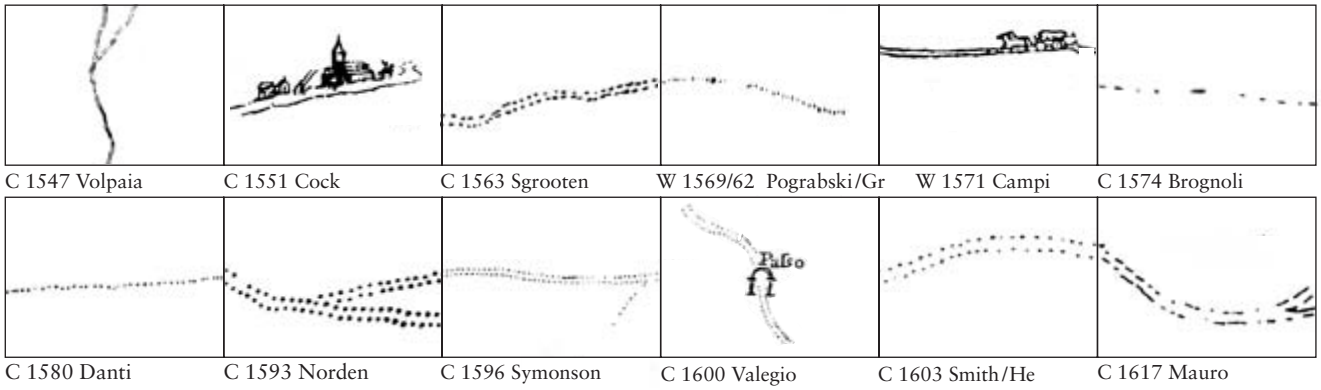


FIG. 21.33. ROAD SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

local footpaths and tracks with national and international highways in a complex communications network. Nothing approaching a comprehensive network is found on early modern printed topographical maps. Instead, Renaissance mapmakers usually selected a single level of road to represent, normally a highway (fig. 21.33). On Danti's map of the district of Perugia (1580), the roads shown are those that radiate from the central place, the city of Perugia itself. Occasionally interconnecting crossroads are indicated, as on Eufrosino della Volpaia's highly detailed map of the Roman Campagna (1547), Apian's map of Bavaria (1568), and some of Norden's and, after him, Smith's maps of English counties. Other mapmakers included only an isolated stretch of road. On Gigas's roadless map of Paderborn (1625), an isolated intersection is depicted, labeled "Creutzwech" but otherwise unexplained.

The usual way of representing roads was by means of two parallel lines. Sometimes vignettes of pedestrians or riders were added, as if to confirm the meaning of the map sign.[176] The road lines may be dotted or pecked. Usually the same sign is used throughout the map, but Aretinus marked two roads with different signs on his map of Bohemia (1619); for one he used vertical lines of irregular height (as if to suggest a much-used sunken trackway), and for the other, identified as "new," he used the usual pecked lines. On Apian's map of Bavaria (1568), four examples of short, broad tracks (fig. 21.34*a–d*), one almost certainly indicating a built-up causeway (*b*), appear to be roads or trackways of some sort, but are difficult to interpret without further evidence.[177] Some may be associated with industrial activities such as timber logging, in which felled logs are customarily rolled downhill to a stream or lake for transport by water, or mining, in which wooden wagons carrying mineral ore or sledges with the miners themselves (as in fig. 21.34*e*) are likewise slid downhill. Mountain passes were rarely given a special sign, except by the anonymous compiler of the map of Valtellina (1600), who marked each pass by an arch labeled *passo* and used parallel pecked lines to indicate the continuation of the track between the head of the streams on either side of the pass, although not the rest of the road or any other roads.

Signs for Bridges

Bridges were not mentioned by Ptolemy, and those found on the new maps in printed editions of the *Geography* are Renaissance additions.[178] They are more commonly represented than roads on sixteenth- and seventeenth-century topographical maps (fig. 21.35), where they may have been intended to indicate the most reliable crossing points. Later in the seventeenth century, Lubin agreed that "a most useful thing would be to have maps which gave all bridges," but warned his readers not to "believe the [map] mark to be always infallible," as he himself had been inconvenienced by nonexistent or broken bridges shown on a map.[179] Possibly, too, mapmakers indicated only the bridges they knew about. On Danti's map of the district of Orvieto (1583), the contrast between the den-

176. On the map engraved by Hieronymus Cock of the environs of Parma (1551), settlements bisected by the road are shown in apparently realistic detail.

177. One is shaded to indicate a causeway over the marshy valley bottom, another has a fence of woven hurdles on one side, the third cuts across a forest and has the word *Hensteig* (steep track) written at one end, and the fourth cuts across apparently rolling open country and has a triangular pointer at each end; see sheets 11, 18, 10, and 16, respectively.

178. Bridges are shown only on the "new" maps, for example, the fourth map of Europe (Gaul) in the Florence, 1482, and Ulm, 1482, editions.

179. Lubin also promised to make such a map himself, if not prevented by other commitments, in *Mercure geographique,* 301.

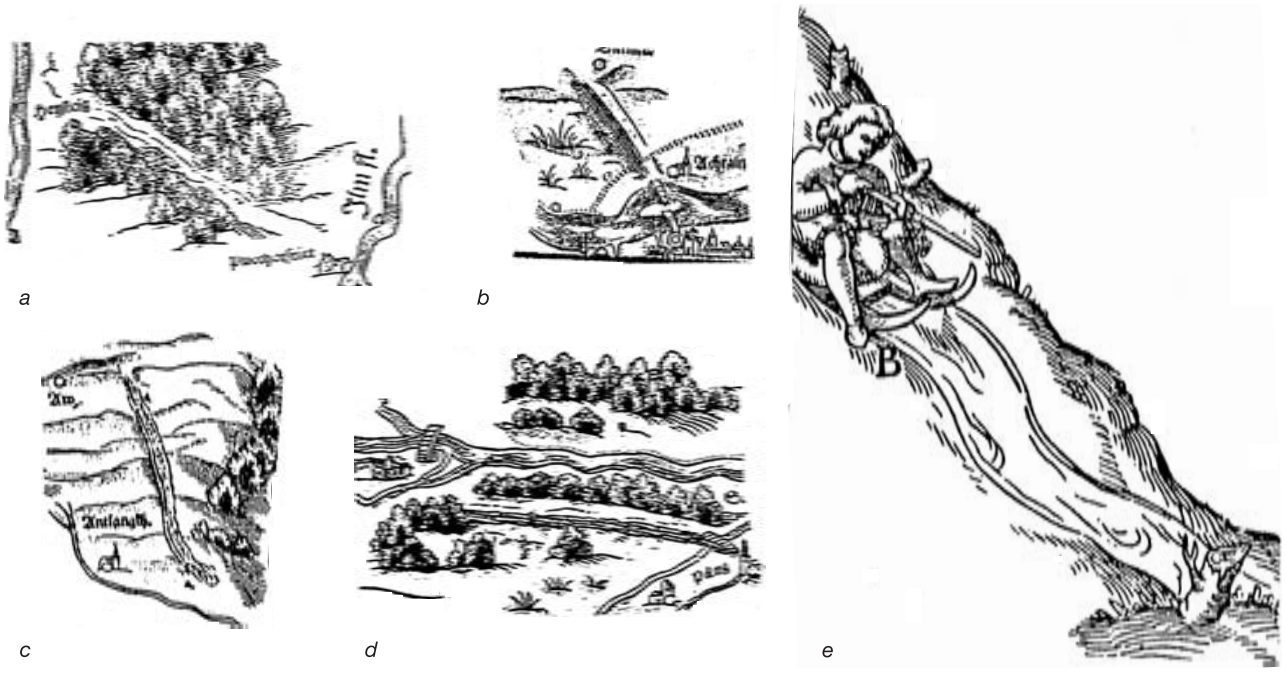


FIG. 21.34. DIFFICULT-TO-UNDERSTAND MAP SIGNS. Some map signs are difficult to understand if no key is provided. The details on the left (*a–d*), from Philipp Apian's map of Bavaria (1568; sheets 10, 11, 16, and 18), seem to represent special types of tracks, causeways, and possibly sledge runs or timber slides. On the right (*e*) is a detail from a woodcut in Georg Agricola, *De re metallica* (Basel, 1556), bk. 6, showing how loaded sledges were used by miners, in this case, or to transport ore mined during the summer down the mountain, a possible explanation of some of the signs on Apian's map.

sity of bridges in the immediate environs of the city and their relative sparsity farther away in the surrounding countryside could illustrate such a tendency. On other maps, it is clear that bridges over major rivers were marked, but not those over tributary streams, as in the case of Tassin's map of the Orléanais (1634). Rarely is a bridge connected to a road. Exceptions include some of Norden's and Smith's maps of English counties and Mauro's map of Sabina (1617).

A variety of signs were used to indicate bridges, ranging from a notional pair of short parallel lines to detailed portrayals of the whole complex of towers and buildings, parapets, piers, arches, and starlings. Bridge lines may be straight, and with or without sharply angled ends, or they may be slightly curved, with one line thicker than the other as if to suggest the parapet or the height of the bridge above the water. Arches were sometimes suggested by a scalloped line or simply a series of dots or short lines. Wooden bridges were distinguished from stone bridges by transverse lines imitating planks. Incautious stylization resulted in a sign resembling a ladder rather than a bridge, as on Porębski's map of Auschwitz (1563). The causeway over marshland on Apian's map of Bavaria (1568) has already been mentioned.

Signs for Fords and Ferries

One might suppose that fords and ferries were far too commonplace to merit inclusion on contemporary topographical maps, even had there been space for any of them. Thus, although Saxton showed over two thousand bridges on his maps of the counties of England and Wales, the maps include few ferries.[180] Sometimes the continuation of a road across a river implies the existence of a crossing point, as is occasionally confirmed by the word "ferry" or "ford." On other maps, a pictorial sign is used that represents, most realistically, a boatman poling his way across the river guided by a rope or pole fixed to timber uprights on each bank, as on Bonifacio's map of the Abruzzi (1587) (fig. 21.36). Even so, the ferry, which carried travelers using the important north-south road (not shown on the map) on the Adriatic side of the Italian Peninsula, is labeled *scafa* in case of doubt. The same ferry sign, in schematic style, had already been used on

180. The ferry across the Trent River, which was used by travelers on the Great North Road between London and the north of England, is marked on the map of Lincolnshire (1576).

Bridges

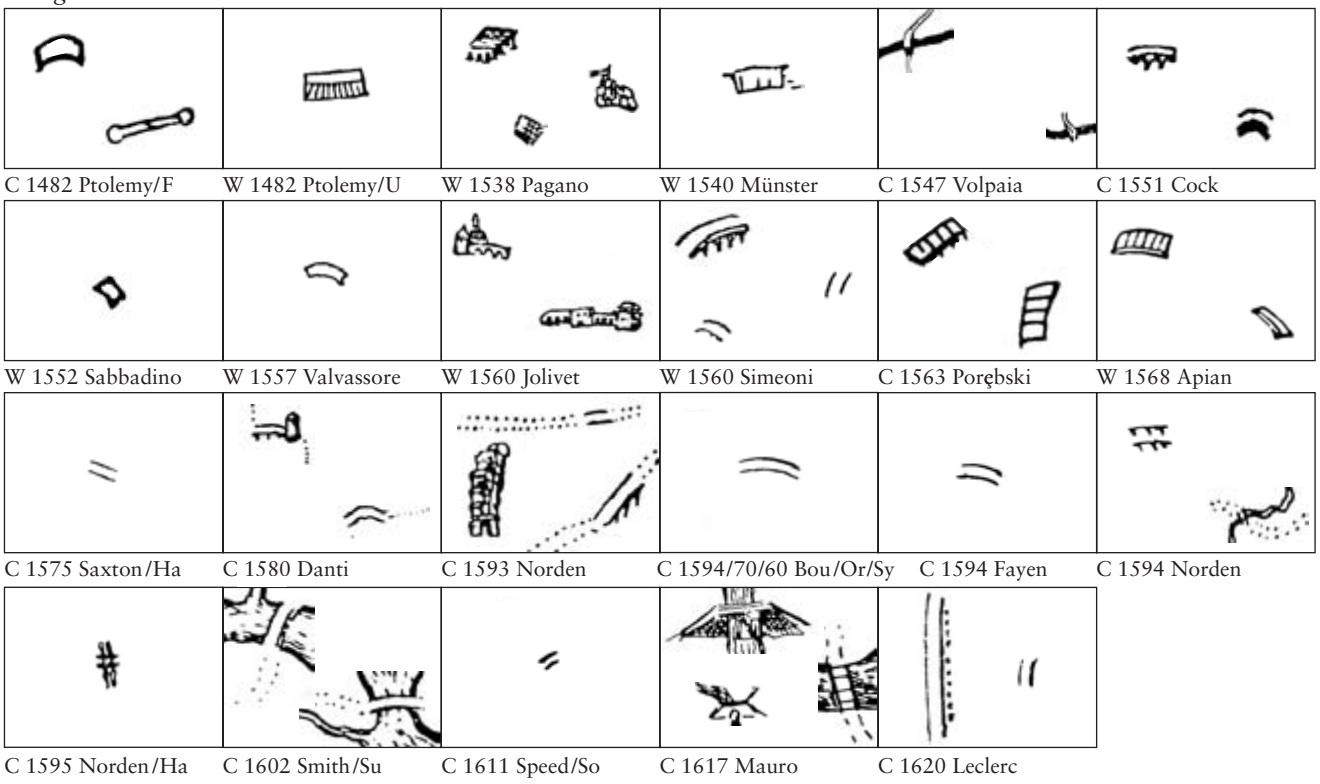


FIG. 21.35. BRIDGE SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

Fords and Ferries

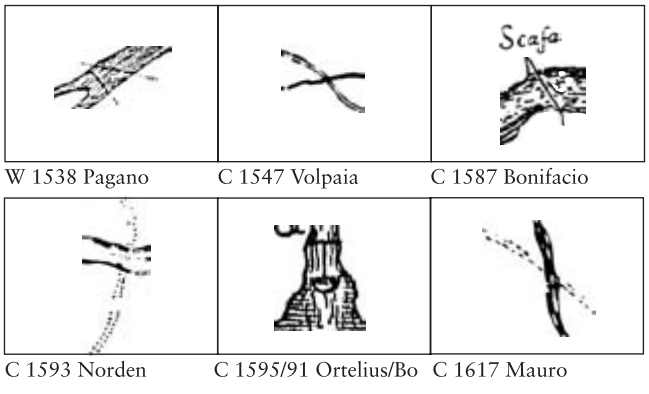


FIG. 21.36. FORD AND FERRY SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

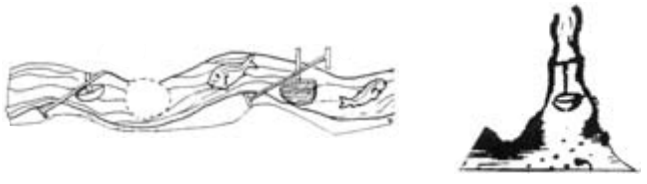


FIG. 21.37. TWO EXAMPLES OF FERRY SIGNS. These ferry signs come from the Madaba mosaic map of Palestine (A.D. 542–62) and from Pierre-Jean Bompars's map of Provence (1591) as re-engraved in 1619 by Hugues Picart from Abraham Ortelius's version (1594). The Madaba sign (left) is taken from John Wilkinson, trans., *Jerusalem Pilgrims before the Crusades* (Warminster, Eng.: Aris and Phillips, 1977), endpapers.

Simeoni's map of Auvergne (1560) and appeared later on Bompar's map of Provence (1591) and on both Bouguereau's and Ortelius's versions of Bompar's map (1594 and 1595, respectively). On these maps the sign has been simplified to a half-moon with a single upright and a short cross bar on top of that in a form strikingly similar to that on the sixth-century Madaba mosaic map (fig. 21.37).[181]

Signs for Beacons and Lighthouses

Among the miscellany of details added to some maps are landmarks such as inland beacons and coastal lighthouses (figs. 21.38 and 21.39). England had a long tradition of maintaining a nationwide beacon network as a general warning system and for the mustering of troops.

181. Bompar showed at least three ferries, two across the lower Rhône and the *bac de Saint-Laurent* at the mouth of the Var.

Beacons

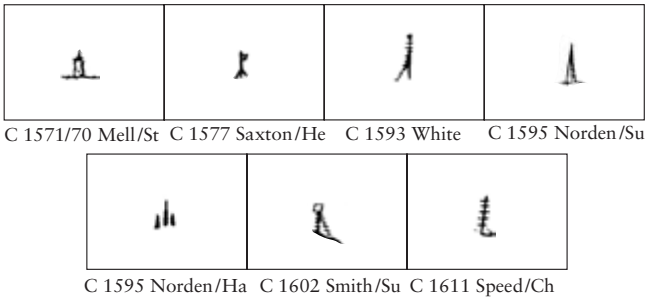


FIG. 21.38. BEACON SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

Lighthouses

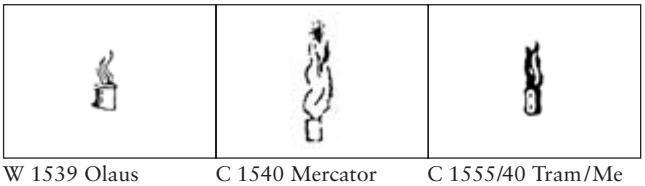


FIG. 21.39. LIGHTHOUSE SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

By the 1570s, when political relations with Spain were deteriorating and fear of invasion was increasing, Saxton marked some of the beacons on his county maps with two types of pictorial signs, both of which revealed different types of structure, one a single tall post, the other a tripod frame topped by a basket containing flammable material, both with a ladder for access.[182] When Norden reduced the sign to three tiny vertical lines, as on his map of Hampshire (1595), he had to explain its meaning in the key. Stella's inland *warte,* or lookout towers (map of Mansfeld, 1570), and Olaus Magnus's coastal beacons, or lighthouses (*Carta marina,* 1539), seem to have been sturdy stone constructions. They also had to be explained if they were not to be confused with other structures.[183]

Signs for Anchorages and Hostelries

The marking of anchorages and hostelries on a topographical map designed for inland use (fig. 21.40) can hardly be considered as providing essential geographical information, and indeed such signs are rarely found on Renaissance topographical maps. The presence of signs for anchorages, together with the portrayal of the iron rings fixed into the rocks by local lords to provide a safe berth for ships seeking shelter along the rocky west coast of Norway on Olaus Magnus's *Carta marina* (1539), reflects the eclecticism of a devoted regional historian. Olaus also depicted the lodgings or hostelries on the ice of the frozen Baltic Sea. These seemed to have puzzled people, because twenty years later, Olaus repeated the sign as an illustration in his book and explained that "although this picture was drawn and printed on my Gothic map at Venice in the Patriarchate during the year 1539, and covered a long stretch of sea off the shores of the Baltic, there were not as many explanations with it as were needed to make it plain."[184] He then went on to give a detailed account of the construction and use of the lodgings. Similar tavern signs are found on Vincenzo Luchini's map of the Marca d'Ancona (1564) and on Apian's map of Bavaria (1568), but rarely elsewhere.[185]

Signs for Inland Navigation and Shipping Routes

Navigable rivers were important arteries for trade and travel, and an early modern mapmaker would not have considered it necessary to identify the navigable reaches. In the lowlands of northwestern Europe, however, rivers and canals were associated with some of the major transcontinental trading arteries and were occasionally represented (fig 21.41). In Flanders, Van der Beke explained in a cartouche that the named rivers on his map of the country (1538) were those that were navigable. In Brabant, Deventer drew attention to the asterisks on rivers that were supposed to mark the point from which each stream was navigable (1536).[186] Not far away, in Germany, Gigas told users of his map of Münster (1625) that the Lippe River, a left-bank tributary of the Rhône, was navigable as far as Lippstadt. On Van Langren's map of Brabant (1635), the locks on the canals are represented in plan view.

Signs for Distance Lines

Calculating distances was not easy for many people in a period when arithmetic had only recently been introduced into the university curriculum and was taught only rudimentarily in schools. Some mapmakers thought it

182. William Lambarde, *A Perambulation of Kent: Conteining the Description, Hystorie, and Customes of that Shyre,* increased and altered by the author (London: by Edm. Bollifant, 1596), contains a map showing the network of beacons over the whole of the county of Kent.

183. Stella includes the watchtower sign in the key on the map. Olaus Magnus did not identify lighthouses on his map but later described them in his *Description of the Northern Peoples,* 2:602, esp. 604–5.

184. Olaus Magnus, *Description of the Northern Peoples,* 1:59.

185. On the use of the hostelry sign in England, see Peter Clark, *The English Alehouse: A Social History, 1200–1830* (London: Longman, 1983), 29 and pl. facing 176. The suggestion that the sign was not used in Sweden comes from the commentary on bk. 1, chap. 26, of Olaus Magnus, *Description of the Northern Peoples,* 1:86.

186. The key reads, "The rivers so far as they are navigable, are drawn like this, *" and continues without punctuation to the next item (measurement of distances from one circle with a dot to another). An explanation was given because the marks on the map are small and are few and far between, and their meaning would otherwise be unclear. I am grateful to Günter Schilder for the translation.

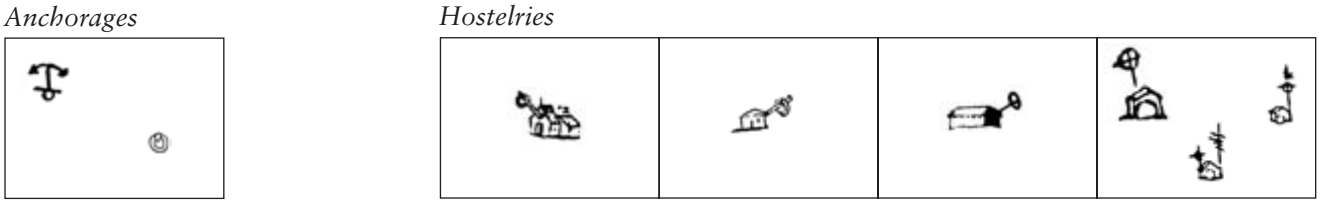


FIG. 21.40. ANCHORAGE AND HOSTELRY SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

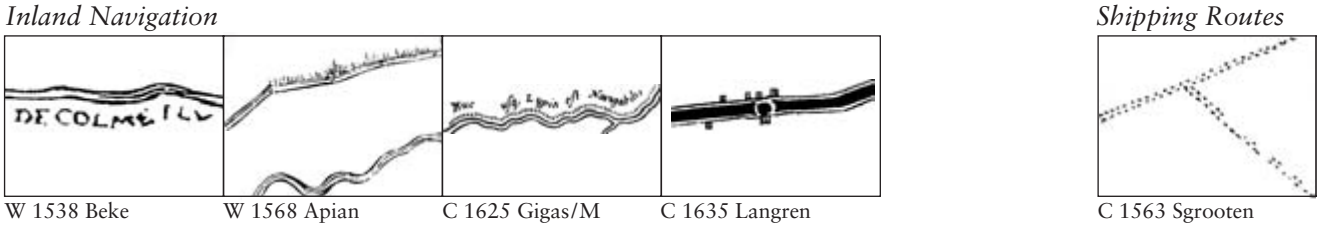


FIG. 21.41. INLAND NAVIGATION AND SHIPPING ROUTE SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

added to the attraction, and usefulness, of their maps to include information about distances between places on their maps. This was done in various ways (fig. 21.42). On some maps, as already noted, routes were marked by means of mileage dots. On other maps, a ruled line was used to connect selected pairs of places and the mileage noted near the line, either above or below it. The latter technique was not new; distance lines had been used on medieval maps, such as the Gough map of England and Wales (ca. 1360), and in the early fifteenth century in Italy.[187] Without knowing more about the purpose and context of each map on which these lines appear, it is difficult to know why they were added, especially as the networks presented on the maps encountered in the present survey are generally isolated and limited in extent.[188] More frequently, the distance lines radiate from a central place to others, either on the map or off it, and their presence can be seen as simply providing as much information as possible for the general reader. On Wissenburg's map of the Holy Land (1538), the lines radiate from Jerusalem, although they are marked only toward the edges of the map to avoid overloading an already packed map. On Cristoforo Sorte's map of the Brescia region (1560), the lines give distances from Brescia. On Stella's map of the Holy Land (1557) and Apian's map of Bavaria (1568), the need for lines is avoided altogether by giving the distances, with the place-names to which they apply, in the maps' decorative borders.[189]

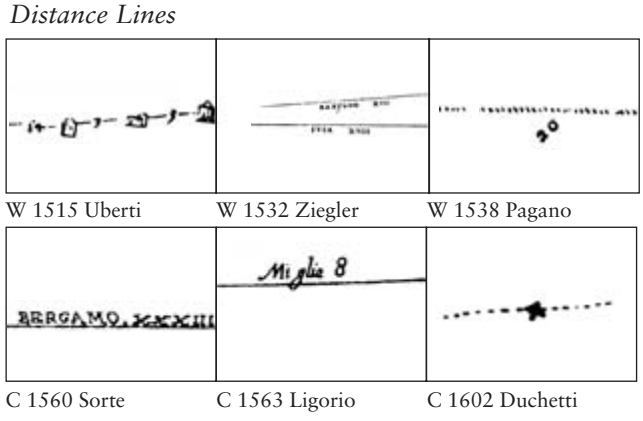


FIG. 21.42. DISTANCE LINE SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

SIGNS FOR AGRICULTURE, HUNTING, AND FISHING

Agriculture was the normal means of livelihood for about 90 percent of the inhabitants of Europe throughout the early modern period. Even large cities contained plots of

187. The Gough map is in Oxford, Bodleian Library, MS. Gough Gen. Top. 16. See Edward John Samuel Parsons, *The Map of Great Britain circa A.D. 1360, Known as the Gough Map: An Introduction to the Facsimile* (Oxford: Printed for the Bodleian Library and the Royal Geographical Society by the University Press, 1958). The Italian map referred to is a map of Lombardy now in the BNF, Ge. C. 4090; see Almagià, *Monumenta Italiae cartographica,* pl. VIII (1).

188. Uberti shows a number of battle sites on his map, and it is possible that the information about distances between the selected places has to do with contemporary Franco-Italian hostilities. On the map in general, see Peter Barber, "The Maps, Town-Views and Historical Prints in the Columbus Inventory," in *The Print Collection of Ferdinand Columbus (1488–1539),* 2 vols., by Mark McDonald (London: British Museum Press, 2004), 1:246–62.

189. The border with the distances was removed for the second state of Stella's map of the Holy Land (1559): BNF, Port. 205 (568); see the reproduction in Kenneth Nebenzahl, *Maps of the Holy Land: Images of* Terra Sancta *through Two Millennia* (New York: Abbeville, 1986), 76–77.

arable land and pasture within the walled area, and all towns were surrounded by their own fields. In all but a few regions (such as Aragon in Spain and Aragon-ruled southern Italy), the predominant type of agriculture was mixed farming. As in the case of trees, though, agriculture was far too commonplace an activity to be recorded on printed topographical maps except where something unusual merited a remark. The presence of vineyards was noted more often by northern mapmakers. Thus Ortelius (copied by Van den Keere in 1618) drew attention to the northern limit of viticulture in Bohemia on his version of Johannes Criginger's map of Bohemia (1570), taking his information from Münster's *Cosmography* (1545) and noting on the map that "these hills mark the limit of the vineyards." In southern Europe, where vineyards were common, only Volpaia (1547) depicted an isolated and perhaps locally significant enclosure, labeled "vigna."

All the signs are pictorial, albeit generally stylized. Arable land was marked by lines representing the furrows of ploughed land or the edges of individual strips (fig. 21.43). The lines may be solid or broken. They are often bent to show the characteristic reverse S curve of ploughed strip fields, as on Stella's map of Mansfeld (1570). On some maps, a field or two of standing grain may be shown. Pressure on good arable land led to widespread attempts to extend the area under cultivation. In southern Europe, marsh was reclaimed wherever possible, usually by the process of *colmatzione* (ponding). Magini represented areas reclaimed in this way south of the Po River delta with a roughly sketched grid of pecked lines (map of Rovigo, 1595) and showed isolated inland schemes in a similar fashion on his map of Apulia (1620). In northern Europe, the major areas of reclamation were the polder lands of the Low Countries. Again, no special sign was used on maps; the angular articulation of the drainage ditches and canals was a sufficient indicator of the nature of the landscape. Vineyards were only occasionally shown by means of a naturalistic sign like Wolfgang Lazius's bunch of grapes and oversized leaf (1556) (fig. 21.44). More usual were the various stylized forms that, echoing medieval illumination, mimicked the way the vine twists around the stake. When Fabert's map of Metz (1605) was copied for Leclerc's atlas (1617), Fabert's gracefully twisting S-shaped stem of a heavily pruned plant was replaced by an even more stylized sign, in which the stem of the vine was no more than a short line, slightly curved and angled downwards, across the vertical line of the supporting pole.[190]

Hunting and fishing were rarely noted on maps (fig. 21.45). Game animals were sometimes discretely portrayed. In 1569 Pograbski added a hunting scene to his version of Wacław Grodecki's map of Poland of 1562. On Blaeu's version of Henneberger's map of Prussia (1635), forest hunting lodges are represented by a hunting horn.

Arable Land

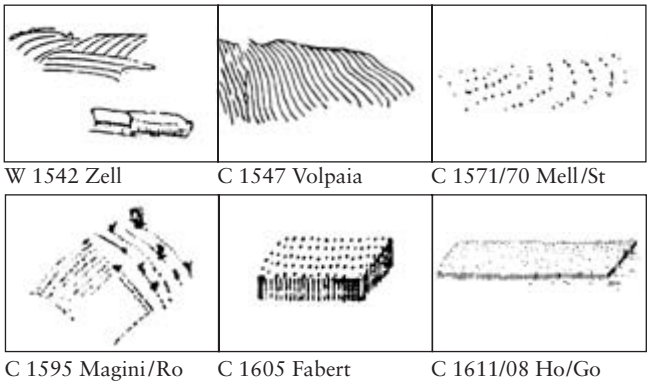


FIG. 21.43. ARABLE LAND SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

Viticulture

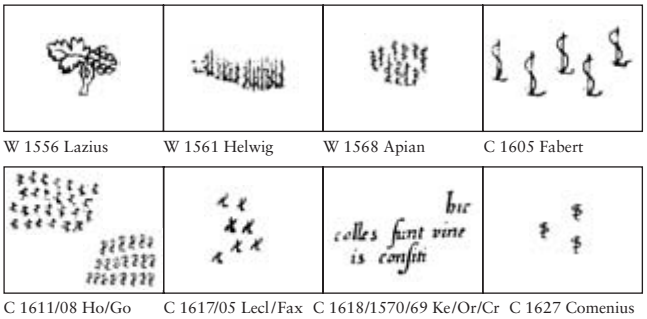


FIG. 21.44. VITICULTURE SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

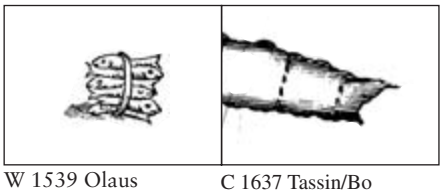
Structures that could be fishing weirs are shown on Tassin's map of the Boulonnais (1637). Olaus Magnus's uniquely picture-rich map of the Scandinavian countries (1539) records all forms of hunting and fishing, on land, at sea, and on the ice. For instance, bundles of fish, already prepared for transport, are portrayed in engaging verisimilitude.

190. Both Lazius's and Fabert's signs were used by Münster in the 1550 Latin and German editions of his *Cosmography* (Basel, 1550); for example, see the woodcut illustration of a bunch of grapes on p. dccxxvii of the German edition and the view of Heidelberg with surrounding vineyards on p. dcclii (folded). The illustrations are not identical in the different editions, and Dainville, *Langage des géographes*, 327 (fig. 47), reproduces another version of the naturalistic sign as well as the stylized sign from, in his case, the view of Freiburg on p. 558 (Latin edition). Vines grown on trellises are represented in Münster's view of Wissemburg (pp. 466–67, Latin edition), and detailed in an illustration in the text at that point, but this form has not been noted on the topographical maps examined.

Hunting

W 1542 Zell C 1584/84 Ortelius/He C 1629/1584 Ho/He

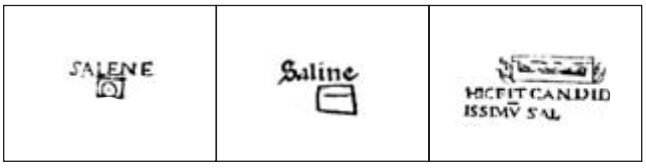
Fishing



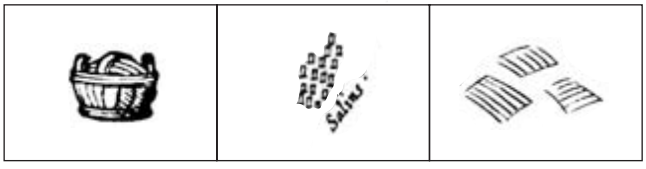
W 1539 Olaus C 1637 Tassin/Bo

FIG. 21.45. HUNTING AND FISHING SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

Salt Production



C 1477 Ptolemy/B W 1482 Ptolemy/U W 1539 Olaus



W 1568 Apian C 1619/1595/91 Lecl/Or/Bo C 1621 Leclerc

FIG. 21.46. SALT PRODUCTION SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

SIGNS FOR NATURAL RESOURCES INDUSTRIES

The Renaissance was a period of prosperity in Europe's industrial history. By the end of the fifteenth century, old mining areas had been revitalized, and from then on, new areas were being opened up. In central Europe, large-scale operators were replacing or absorbing the scattered peasant units, leading to the development of new mining townships: Joachimsthal (Jáchymov) in Bohemia, where the mapmaker Johannes Criginger was born in 1521, had been a booming mining camp only five years previously.[191] The output of the mineral-rich Erzgebirge gave the German lands a near-monopoly of Europe's gold, silver, copper, and tin output in the sixteenth century. The best mirrors came no longer from Italy but from the forests of eastern Europe, where the manufactories had been introduced by German merchant entrepreneurs.[192] Salt was mined in northwest England and central Europe, or distilled from brine under natural conditions in southern Europe or in artificially heated pans farther north.[193] As Lubin commented in 1678, saltworks were far "too useful and too wonderful to be ignored by geographers," and he reproached geographers for not finding out more about them and placing them on maps, although they were represented on some of the maps in our sample (fig. 21.46).[194] Altogether, a score of different industrial activities have been recorded on early modern printed topographical maps, not counting those on Olaus Magnus's remarkable map. As was the case with so many other nonbasic features of human or physical geography, however, the proportion of maps on which any one activity appears is small.[195]

The iron mines of Bohemia had been noted by Ptolemy and were represented in words (*ferri minera, minera ferri*) on his fourth map of Europe, both manuscript and printed versions (e.g., 1477, 1478, and 1513) (fig. 21.47). The saltpans of Provence are not mentioned in the *Geography* and are found only on the new third map of Europe added in the fifteenth century to the Bologna (1477), Florence (1482), and Ulm (1482) editions. Lacking an extensive traditional map vocabulary for industrial activities, Renaissance mapmakers either found or made up signs as they needed them, using both abstract and pictorial forms. There was always the risk that an unfamiliar sign, or an unexpected category of information, might not be recognized, and industrial signs more than most needed identification. When an industry was shown no more than once or twice on the map, a label sufficed, as

191. Georg Agricola, *De re metallica* (Basel, 1556); for an illustrated modern translation, see *De re metallica,* trans. Herbert Hoover and Lou Henry Hoover (New York: Dover, 1950), vii.

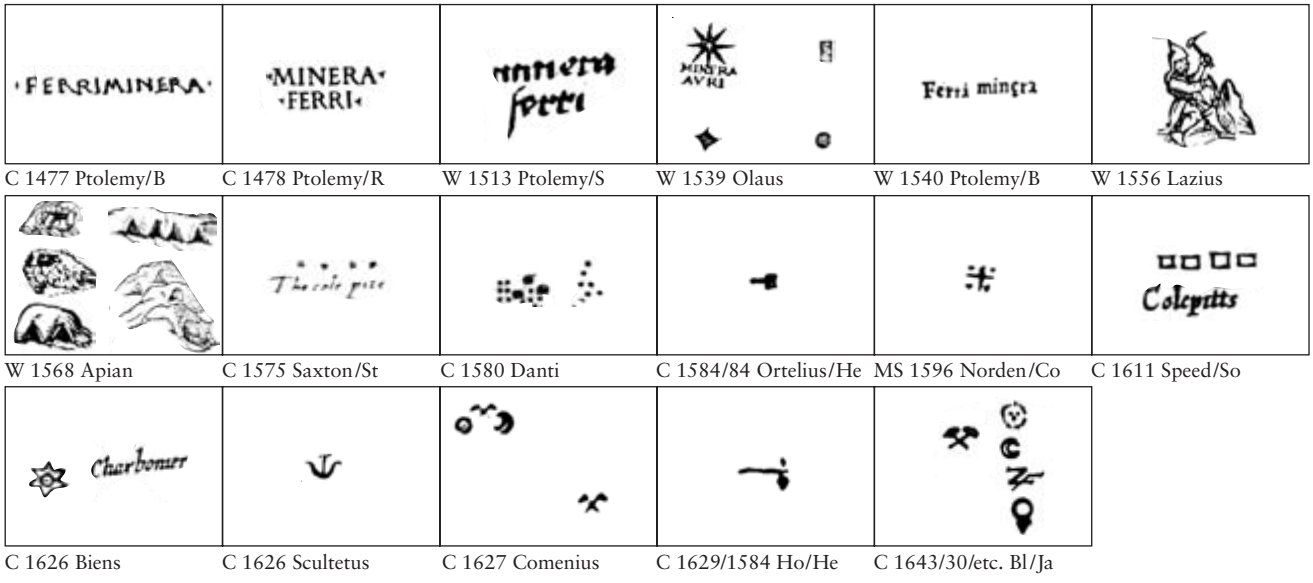
192. Production of the new-style flat, lead-backed mirror had started on the island of Murano, Venice, in the early fifteenth century; see Clifford T. Smith, *An Historical Geography of Western Europe before 1800* (London: Longmans, 1967), 364–65.

193. Apian (1568) shows a linear feature near Schoellnperg (Marktchellenberg), which lies in the salt mining region near Salzburg, thought to represent a wooden pipeline conveying brine from the mines to the town (presumably for treatment). I am grateful to Jan Mokre for this explanation.

194. Lubin, *Mercure geographique,* 307–8.

195. The stimulus in German-speaking lands to map industrial features has been ascribed to the humanists' "new-found zeal to depict their own country" and "a sincerely felt, if somewhat contrived, patriotic fervor"; see Gerald Strauss, *Sixteenth-Century Germany: Its Topography and Topographers* (Madison: University of Wisconsin Press, 1959), 6–7. The natural wealth and wonders of the Germanic regions would have been considered worth boasting about as a counter to countries such as France and Italy, whose Roman heritage of architectural and artistic splendors qualified them as uniquely "civilized." Strauss also points to the Germans' enthusiasm for new maps that would correct the errors not only on Ptolemy's maps but also on the maps of "our own countrymen, [who] in describing German lands, make such clumsy mistakes that an Egyptian could hardly do worse," to no credit to the country (p. 10).

Mines and Quarries



C 1477 Ptolemy/B | C 1478 Ptolemy/R | W 1513 Ptolemy/S | W 1539 Olaus | W 1540 Ptolemy/B | W 1556 Lazius

W 1568 Apian | C 1575 Saxton/St | C 1580 Danti | C 1584/84 Ortelius/He | MS 1596 Norden/Co | C 1611 Speed/So

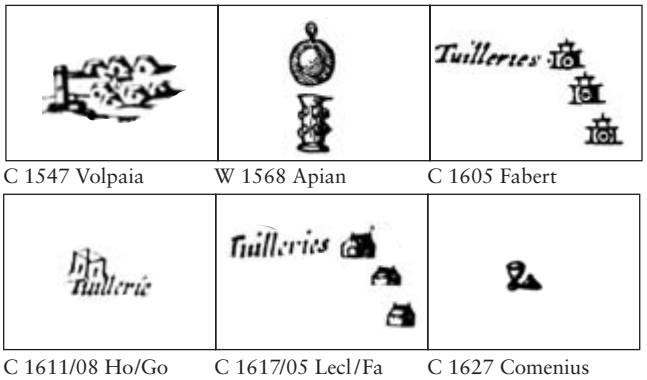
C 1626 Biens | C 1626 Scultetus | C 1627 Comenius | C 1629/1584 Ho/He | C 1643/30/etc. Bl/Ja

FIG. 21.47. MINE AND QUARRY SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

in the case of the Bohemian iron mines on the Ptolemaic maps. Saxton also referred to the twelve (fulling) mills below Cheddar Gorge (Somerset, 1575). Even when he gave mines a graphic sign, he labeled them as well, for example, "cole pits" in Somerset, and metalliferous "mynes" in Cumbria.[196] Likewise, a group of dots on Danti's map of Perugia (1580) would convey nothing to the outsider without the accompanying explanation that these were the ochre quarries discovered by his father. Labeling was also needed to avoid misunderstandings. When Fabert (1605) used an ordinary village sign for a group of tile works, he had to label them as *tuileries* (fig. 21.48). No such explanation, however, elucidates the significance of a star-shaped sign on Jean de Beins's map of Dauphiné (1626), near the French alpine town of Charbonières. Charbonières was surrounded by ironworkings and the associated charcoal burning that is reflected in the placename, and we may infer that the unusual sign was intended to draw attention to the castle at Charbonières, birthplace of the first dukes of Savoy.

On maps with frequent indications of a particular industrial resource or activity, the relevant sign was usually explained in a key. Olaus Magnus (1539) showed gold-, silver-, copper-, and ironworks by means of stars, rectangles, squares, and circles (see fig 21.47) and gave their meaning in the text on the map's cartouche.[197] Apian's iconic mirrorworks and glassworks are explained prominently in the key on his map of Bavaria (1568). Unusual signs, such as the asterisk used by Stella (1570) for smeltworks in the Mansfeld region, and Jonas Scultetus's signs for coal mining (a miner's lamp, not familiar to everybody) and for logging weirs (an E shape) on his map

Manufacturing



C 1547 Volpaia | W 1568 Apian | C 1605 Fabert

C 1611/08 Ho/Go | C 1617/05 Lecl/Fa | C 1627 Comenius

FIG. 21.48. MANUFACTURING SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

of Glatz (1626) (fig. 21.49), certainly needed explanation. Not all industrial signs were explained, though. Bartholomäus Scultetus (1593) and Paulus Aretinus (1619) evidently assumed that their pictorial signs for forges, hammer-ponds, and smeltworks would be easily recognized (fig. 21.50). When some mapmakers started to use alchemists' signs at the end of the sixteenth century, it was essential that these be identified on a map.

196. Maps of Somerset (1575) and Cumberland and Westmoreland (1576). The Cumbrian mines, which produced gold, copper, silver, and lead, had been worked since 1359 by Germans. In the mid-sixteenth century the Fuggers, a leading capitalist family from Augsburg, had taken over; see Francis John Monkhouse, "Some Features of the Historical Geography of the German Mining Enterprise in Elizabethan Lakeland," *Geography* 28 (1943): 107–13.

197. Gold mines alone are also sometimes labeled on the map.

Logging

W 1593 Scultetus C 1626 Scultetus

FIG. 21.49. LOGGING SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

Metal Working

C 1570/67 Ortelius/Cr C 1571/70 Mell/St W 1593 Scultetus C 1619 Aretinus

FIG. 21.50. METALWORKING SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

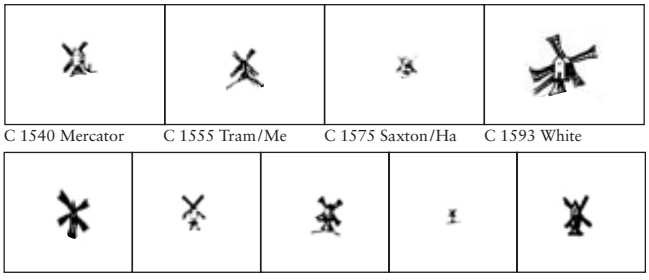
Windmills were widely used in agricultural processing, such as grain milling and woolen cloth fulling, and would have been far too commonplace a landscape feature to merit being shown on most maps. Those that were shown (fig. 21.51) must have been notable landmarks or have had some special local significance. The pictorial signs are often sufficiently detailed to indicate different types of structures. Windmills for lifting water were still relatively rare, except in the Dutch polder lands and the fenlands of eastern England, and were not given any special sign, unlike the watermills that were used primarily for cloth fulling. Norden indicated such mills with a stylized sign representing a wheel with short projecting lines for the scoops on most of his maps.[198]

Natural hot springs (*thermae*) were exploited in Roman times, but none are mentioned by Ptolemy or shown on the old maps of the *Geography.* Yet the bathhouse at Aix-les-Bains (third map of Europe) was featured on the new map of the region added to the Florence edition of 1482 (in plan view) and in the Ulm edition of 1482 (in profile) (fig. 21.52). Later Renaissance mapmakers tended to use a wooden tub as the sign for *thermae* and explained the sign in the key (Lazius, 1556, and Apian, 1568).

SIGNS FOR ANTIQUITIES

Not many Renaissance printed topographical maps fail to show at least one historical feature (fig. 21.53). Ptolemy referred to mythical and historical sites, such as the Pillars of Hercules and the altars marking the limits of Alexander the Great's conquest of Asia, and these were portrayed pictorially in early printed editions of the *Geography* as they had been on the manuscript maps. Many of the classical monuments shown on the early modern printed

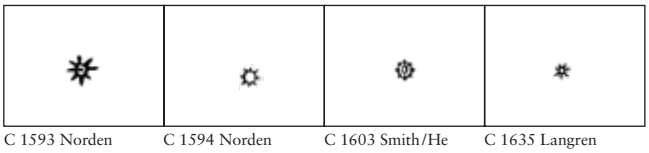
Windmills



C 1540 Mercator C 1555 Tram/Me C 1575 Saxton/Ha C 1593 White

C 1595 Norden/Su C 1596 Symonson C 1611 Speed/Ch C 1635 Langren C 1637 Tassin/Ha

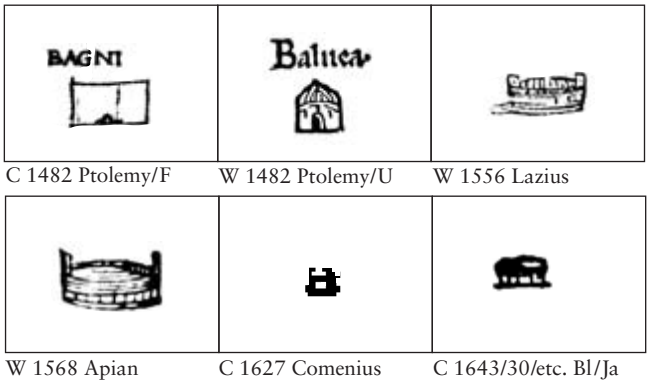
Water-Powered Mills



C 1593 Norden C 1594 Norden C 1603 Smith/He C 1635 Langren

FIG. 21.51. WINDMILL AND WATER-POWERED MILL SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

Thermal Baths



C 1482 Ptolemy/F W 1482 Ptolemy/U W 1556 Lazius

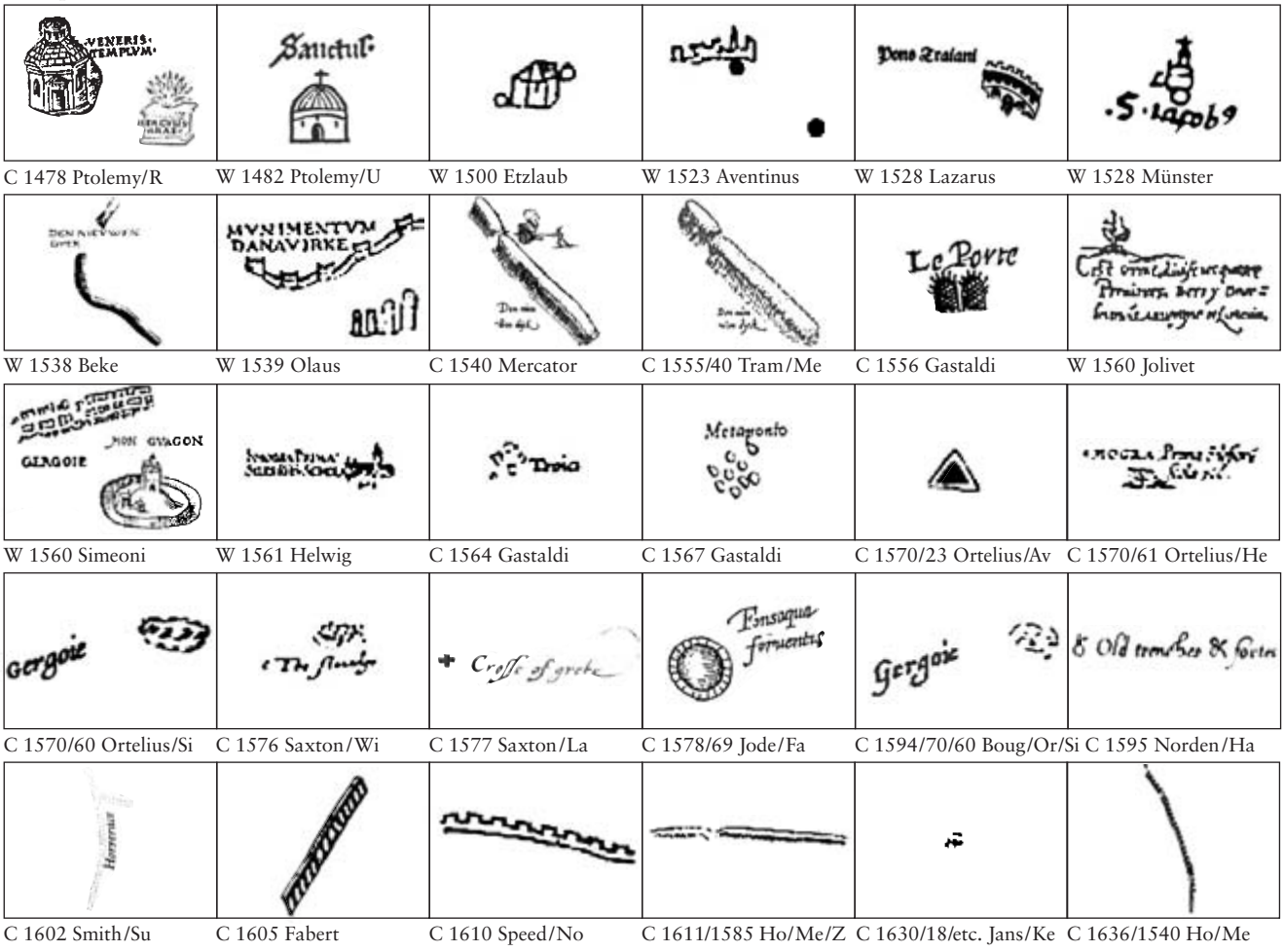
W 1568 Apian C 1627 Comenius C 1643/30/etc. Bl/Ja

FIG. 21.52. THERMAL BATH SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

topographical maps would have been still prominent in the landscape, others known only from ancient sources and local traditions. The range of features represented on one map or another is, as we have by now come to expect, eclectic: prehistoric standing stones and henge monuments such as Stonehenge; the sites of pre-Roman hill forts (*oppida*), such as Gergovia in the Auvergne, and Roman towns; Greek temples in Italy, as at Metapontum; and Roman structures such as aqueducts, Trajan's bridge

198. The textile industry was by far the single most important industry throughout Europe. Most weaving was carried out in towns, but in England at least the fulling of the woven cloth had largely moved out into the countryside by the sixteenth century to take advantage of water power. Flanders, Lombardy, and Catalonia were the three major cloth-producing regions. See Norman John Greville Pounds, *An Economic History of Medieval Europe,* 2d ed. (London: Longman, 1994), 303–14.

Antiquities



C 1478 Ptolemy/R | W 1482 Ptolemy/U | W 1500 Etzlaub | W 1523 Aventinus | W 1528 Lazarus | W 1528 Münster

W 1538 Beke | W 1539 Olaus | C 1540 Mercator | C 1555/40 Tram/Me | C 1556 Gastaldi | W 1560 Jolivet

W 1560 Simeoni | W 1561 Helwig | C 1564 Gastaldi | C 1567 Gastaldi | C 1570/23 Ortelius/Av | C 1570/61 Ortelius/He

C 1570/60 Ortelius/Si | C 1576 Saxton/Wi | C 1577 Saxton/La | C 1578/69 Jode/Fa | C 1594/70/60 Boug/Or/Si | C 1595 Norden/Ha

C 1602 Smith/Su | C 1605 Fabert | C 1610 Speed/No | C 1611/1585 Ho/Me/Z | C 1630/18/etc. Jans/Ke | C 1636/1540 Ho/Me

FIG. 21.53. ANTIQUITY SIGNS. See appendix 21.1 for details of the maps from which the signs are taken.

over the Danube, and Hadrian's Wall in northern England. The Renaissance saw the emergence of our modern sense of history through the increasing interest in antiquarianism, and this, too, is reflected on general topographical maps as well as those, such as Sophianos's map of Greece (1552), that were slanted more specifically toward antiquity. [199] Simeoni letter-keyed features relating to the story of the Gaulish chieftain Vercingetorix's successful campaign against Julius Caesar in 52 B.C. on his map of the Auvergne (1560). The associated event is explained in the book containing the map, from which we can discover the reasons, for example, for the depiction of broken bridges on the Allier.[200] Likewise, Aventinus's mapping in 1523 of ancient and contemporary settlements in Bavaria would be unintelligible without his explanation on an accompanying sheet of the black dot he used, either with a pictorial settlement sign or alone, to differentiate ancient sites that were still towns and those that were in his day merely villages (or completely uninhabited) from "modern" towns and villages. In 1570, Ortelius respected Aventinus's distinction between old and new sites but made the signs easier to follow by enclosing Aventinus's black dots within a triangle and transferring the much-needed explanation from a separate sheet onto the map itself.[201] Not all historical features necessarily

199. George Tolias, "Nikolaos Sophianos's *Totius Graeciae Descriptio:* The Resources, Diffusion and Function of the Sixteenth-Century Antiquarian Map of Greece," *Imago Mundi* 58 (2006): 150–82.

200. Gabriele Simeoni, *Le sententiose imprese, et dialogo del Symeone* (Lyons: Gugliamo Roviglio, 1560), into which the map is inserted. On p. 160 of the text the author relates how the bridges (identified on the map as D) were destroyed by the Gauls to prevent the Romans from crossing the river.

201. For Aventinus's separate-sheet explanation, see the facsimile published by Joseph Hartmann, *Aventins Karte von Bayern, MDXXIII* (Munich: Geographische Gesellschaft in München, 1899). On Ortelius's version (1570) of Aventinus's map, the names of the Roman places have been put into uppercase lettering, the visual contrast between old and new has been sharpened by the use of bold triangles instead of dots, and the explanation—"The remains of ancient cities are indicated thus"—is on a boldly drawn scroll on the map itself.

dated from classical times. Helwig was a schoolmaster, which no doubt explains his personal interest in portraying "the first school in Silesia" on his map of Silesia (1561) with the date 966.

The general practice was to signal antiquities and other special features pictorially, but abstract signs were also used. Sgrooten, who warned map users that the exact site of ancient places was often "ambiguous and uncertain," marked them differently from other places.[202] Battle sites were often recorded in writing or by means of pictorial signs portraying phalanxes of armed warriors facing each other or in active combat. Lazarus used a pictorial sign for the battle of Mohacs (29 August 1526), but highlighted the point where King Louis II of Hungary met his death by means of an abstract sign (a white cross on a black circle). Crosses were used for battle signs, as were pictorial signs later in the sixteenth century, although individual mapmakers were not necessarily consistent in their selection of sign. Norden marked both battle sites shown on his map of Middlesex (1593) with a cross, but five years later used a pictorial sign for one of the sites (Barnet) on his map of Hertfordshire and crosses for two others. Mercator used a serifed cross to mark the site of the battle of Montcontour on his map of Anjou (1585), but the site was noted only in writing on Licinio Gueto's map in Ortelius's second *Additamentum* (1579).

Many of these individual signs were selected for their topicality or because they were part of contemporary culture. Many, then, would have had little significance for later generations. Certainly later engravers showed scant regard for the signs, which through successive copying could become unrecognizable. For example, the clarity of Mercator's rendering of *Den nieuwen dijck* (the New Dyke) (1540) (see fig. 21.53), first shown by Van der Beke on his map of Flanders (1538), degenerated through nearly every derivative map or copy of Mercator's map until it was reduced to meaningless lines on Hondius's versions (1611 and 1636).[203]

Conclusion

The maps discussed in this chapter came from three different production contexts. First, there were maps compiled by individuals who may otherwise have had little to do with mapmaking or even printmaking. Without being overly anachronistic in our use of the term, these were "amateurs." Almost a third of those whose maps were used by Ortelius appear to have made no more than a single map, at most two, in a lifetime, yet for three-quarters of the sixteenth century, the first printed topographical map of a particular region was more often than not the work of one of these amateurs.[204] Second, there were maps produced by a handful of outstandingly prolific individuals who also operated on their own, but were linked to a wide, loosely organized network of related crafts—engravers, printers, suppliers, colorists—in a horizontally structured publishing industry. Finally, there were the atlas maps, which by the early seventeenth century had come to dominate map production almost entirely and which were marketed separately as well as in the bound volume. Such maps were only occasionally new; the vast majority were copies.[205]

The most striking characteristic of the maps in atlases produced at the end of the sixteenth century and in the early decades of the seventeenth century, apart from the lack of standardization noted at the beginning of this chapter, is a tendency toward minimalism. Rationalization meant not wasting money redesigning the signs found on the old exemplars but changing the decoration of the cartouches and rearranging their position on the map, as well as updating dedications, dates, and signatures. Even "essential" geographical information was more likely to be omitted than added. Over a quarter (27 percent) of the maps in Tassin's atlas, *Les cartes generales de toutes les provinces de France* (1634), show no relief at all beyond an occasional scatter of hill signs in an otherwise empty space around the edge of the map, a quarter show no vegetation, and a quarter indicate no boundaries. Elaboration of map content was also minimal. Little detail is given about the ecclesiastical status of settlements, for instance, and only two or at most three settlement categories are differentiated. "Extra" information was evidently considered unnecessary information and is almost absent. To add to the intellectual sterility of Tassin's and similar atlas maps, there is visual blandness; the map signs are small, if not minuscule, and almost lost in a sea of empty space. For all the neatness of their appearance, they are no more uniform in composition, perspective, or semiotic style than were the signs on earlier maps and maps not made specifically for an atlas.

In general, the increase between about 1470 and about 1640 in the range of features appearing on printed topo-

202. Sgrooten's "ambigua & incerta" places are indicated by a point and a single circle (instead of the double and triple circles used for other places), as explained in the key in the bottom right corner of the map; see the reproduction in Nebenzahl, *Maps of the Holy Land,* 82–83. Ortelius appears to have ignored Sgrooten's distinctions in his adaptation of the map (1584).

203. Other examples of the degeneration of historical signs are seen in the depiction of the Gaulish town of Gergovia, where the besieging Julius Caesar was defeated by Vercingetorix in 52 B.C., and the eleventh-century circular platform at Montgâçon, with its church, both portrayed by Simeoni on his map of the Auvergne (1560); see figure 21.53.

204. Data taken from Karrow, *Mapmakers of the Sixteenth Century.* Some of these efforts represent major cartographic map projects (Apian's twenty-four-sheet map of Bavaria, 1568), others no more than a single-sheet portrayal of an entirely amateur mapmaker's home area (Jubilio Mauro's map of Sabina, 1617).

205. For examples cited or illustrated in the present chapter, the copying sequence is summarized in appendix 21.1.

graphical maps was not accumulative, as already noted, nor did it affect all three map content categories (essentials, details, and extras) in equal measure. Three-quarters of the overall increase is accounted for by the addition of items from the second category of map content and by the elaboration of essential features, especially those of human rather than physical geography. Only a quarter of the increase represents new "extra" or adventitious information, and most of this was the work of a single mapmaker or was scattered thinly over scarcely more than a half dozen maps by different mapmakers. Some of these features, such as the first Silesian school (shown on Helwig's map of Silesia, 1561, and copied by Ortelius, 1570) or the racecourse on Epsom Downs (Smith, map of Surrey, 1602) were unique. Nor was the provision of an explanation of the signs any more standard a practice at the end of the Renaissance than at the beginning. Common natural features, such as woods and hills, were almost never identified in a key, and one wonders what lay behind the addition of "Woody Places" and "Rivers" to the key on Norden's map of Hampshire when it was reissued by Peter Stent in the second half of the seventeenth century.

When a Renaissance mapmaker needed a new sign, a number of avenues were open to him. He could create a sign by imitating what he could see in the field and use, for example, a continuous line with short vertical hatching for a bluff or scarp, as Waldseemüller did in 1513 on his maps of the Paris Basin, Lorraine, and France in the Strasbourg edition of Ptolemy's *Geography.* Or he could take a picture from a noncartographic source, as Wolfgang Lazius did when he needed a sign for metalliferous mines for his map of Hungary (1556). It is uncertain what Lazius used as a model for his pictorial sign, but his figure of a miner resembles the miners shown in contemporary illustrations, such as those in Sebastian Münster's German *Cosmography* and Georg Agricola's *De re metallica.*[206] Or, finally, the mapmaker could extend his existing range of pictorial signs by the addition of cyphers or codes, as Martin Helwig did on his woodcut map of Silesia (1561). Helwig's four codes are composed of points, circles, and crosses and were imitated by Fabricius, who added two more such signs on his map of Moravia (1569), and retained by Ortelius for his reduced version of Helwig's map (1570).[207] As already noted, however, the idea of coding a pictorial map sign by adding a cipher to extend the range of information communicated by the vignette alone was by no means new in the Renaissance.

For all the marketing power of the Dutch printing houses, commercial map production did not completely extinguish private or smaller-scale initiative. The old tradition of creating a map of a region as a portrait of that region, conveying what modern geographers and historians have termed its *personalité,* could still be found.[208] Maps such as Francesco Valegio's map of Valtellina (1600), the map of Siena engraved by Claudio Duchetti (Claude Duchet) (1602), Lavanha's map of Aragon (completed 1616, printed 1620), and Van Langren's map of Brabant (1635) are examples of maps on which the signs continued the well-rooted tradition of informing the user about a region's physical landscape and its settlement pattern, economy, social structure, and history. The maps designed for the commercial atlas publisher served a different purpose. For Ortelius, the atlas started out as a convenient reference tool for the businessman. [209] For Mercator, the atlas was a vehicle for an ideological exposition of world geography and cosmography. For the Blaeus, atlases were yet something else: commodities to be possessed, admired, and prized.

The history of the signs used on early modern printed topographical maps communicates a great deal about the past geography and societies of the regions depicted on the maps. It also reflects shifts in the way maps were received, perceived, and used by their contemporaries at different times and in different circumstances during the two hundred years or so reviewed in this chapter. It does not, however, record any fundamental change in the signs themselves.

206. An illustrated section on mining in the German lands is first included in the 1550 Latin edition of Sebastian Münster's *Cosmographiae universalis lib. VI.* (Basel: Apud Henrichum Petri, 1550), dxxvii. Georg Agricola's complete and illustrated work on minerals and mining, *De re metallica,* was published in Basel in 1556; for figures of miners, see pp. 72, 73, 90, and 170.

207. The key on Helwig's map provides the only clue as to the significance of the abstract codes accompanying the pictorial signs. Ortelius omitted the pictorial element from three of the signs and used the codes alone as abstract place-signs. For a discussion of Fabricius's and Helwig's maps and reproductions, see Kuchař, *Early Maps of Bohemia,* 33–37 (pl. 7a–b) and 49–56 (pl. 11a–b).

208. The idea of a geographical region's "personality," which originated with French historian Jules Michelet, was widely adopted by twentieth-century French and English geographers and historical geographers. The concept is fully discussed in Jules Michelet, *Historie de France,* new rev. and aug. ed., 19 vols. (Paris: C. Marpon et E. Flammarion, 1879–84), 1:1 and 2:189.

209. See note 44 in this chapter.

appendix 21.1 Maps Used in the Analysis of Signs on Topographic Maps

The medium of each map is indicated as **I** for iron, **C** for copperplate, **W** for woodcut, or **MS** for manuscript. The rest of the entry identifies the map, the original author, and subsequent copyists or publishers. When a detail of one of these maps is shown in a figure, the date, name, and abbreviation in **bold** in the first line of each entry correspond to the information given below the detail in the figure.

MS **1462 Wey**
William Wey, map of Palestine (ca. 1462), Berkshire, Eng., Eton College.

C **1474 Sanudo**
Marino Sanudo's map of Palestine, *Liber secretorum fidelibus de crucis* (Venice, ca. 1320), copied as a "new" map for Ptolemy's *Geography* (Florence, 1474).

W **1475 Brandis**
Lucas Brandis's map of Palestine, *Rudimentum novitiorum* (Lübeck, 1475).

MS **1475 Capodilista**
Gabriel Capodilista's map of Palestine, "Itinerario di Terra Sancta" (1475).

C **1477 Ptolemy/B**
Bologna edition of Ptolemy's *Geography* (1477).

C **1478 Ptolemy/R**
Rome edition of Ptolemy's *Geography* (1478).

C **1482 Ptolemy/F**
Florence edition of Ptolemy's *Geography* (1482).

W **1482 Ptolemy/U**
Ulm edition of Ptolemy's *Geography* (1482).

W **1491 Cusanus**
Nicolaus Cusanus, map of central Europe known as the Eichstätt map, designed possibly some thirty years previously but probably not engraved until 1491.

W **1492 Etzlaub**
Erhard Etzlaub, map of the environs of Nuremberg (1492).

W **1493 Münzer**
Hieronymus Münzer, maps of north and central Europe and of the world in Hartmann Schedel, *Liber chronicarum = Die Schedelsche Weltchronik = The Nuremberg Chronicle* (1493).

W **1498 Mela**
Anonymous map of the known world in an edition of Pomponius Mela's *Cosmography: Cosmographia Pomponii cum figures* (Salamanca, 1498).

W **1500 Etzlaub**
Erhard Etzlaub, *Das ist der Rom Weg . . .* (Nuremberg, 1500).

W **1501 Etzlaub**
Erhard Etzlaub, *Das seyn dy lantstrassen durch das Romisch reych . . .* (Nuremberg, 1501).

W **1511 Ptolemy/V**
Venice edition of Ptolemy's *Geography* (1511).

W **1511 Waldseemüller**
Martin Waldseemüller, *Carta itineraria Europae,* 2d ed. (Strasbourg, 1520).

W **1513 Ptolemy/S**
Strasbourg edition of Ptolemy's *Geography* (1513).

W **1513 Wald/Cr**
Martin Waldseemüller's map of Crete, one of the "new" maps in his edition of Ptolemy's *Geography* (Strasbourg, 1513).

W **1513 Wald/Fr**
Martin Waldseemüller's map of France, one of the "new" maps in his edition of Ptolemy's *Geography* (Strasbourg, 1513).

W **1513 Wald/Lo**
Martin Waldseemüller's map of Lorraine, one of the "new" maps in his edition of Ptolemy's *Geography* (Strasbourg, 1513).

W **1513 Wald/Sw**
Martin Waldseemüller's map of Switzerland, one of the "new" maps in his edition of Ptolemy's *Geography* (Strasbourg, 1513).

W **1515 Cranach**
Lucas Cranach the Elder's six-block map of the Holy Land could have been made at any time between 1508 and 1518, but the date given here is thought the most likely. A close but much reduced copy was included in an edition of the Bible published by Christoph Froschauer the Elder (Zurich, 1525).

APPENDIX 21.1 (*continued*)

W **1515 Erlinger**
Georg Erlinger, *Das heiling Römisch reich mit allen landstrassen* (Nuremberg, 1515).

W **1515 Signot**
Jacques Signot's manuscript map of 1495–98 ("Code Signot") was printed as *La carte d'Italie* and published in *La totale et vraie descriptiõ de tous les passaiges, lieux et destroictz par lesquelz on peut passer et entrer des Gaules es Ytalies* . . . (Paris, 1515). Based on a manuscript map of 1494 (London, British Library, MS. Egerton 619).

W **1515 Uberti**
Luc Antonio degli Uberti, *Lombardia*. Probably made as early as 1515 but not published until 1525.

W **1518 Claudianus**
Nicolaus Claudianus, map of Bohemia (Nuremberg, 1518).

W **1522 Ptolemy/S**
Lorenz Fries's edition of Ptolemy's *Geography* (Strasbourg, 1522).

W **1523 Aventinus**
Johannes Aventinus, *Obern und Nidern Bairn* (Landshut, 1523). Block cut by Georg Apian.

W **1524–26 Coppo**
Pietro Coppo, map of the British Isles from the *Sum[m]a totius orbis* ([Pisano], ca. 1524–26).

W **1524 Erlinger**
Georg Erlinger, *Lage der deutschen und aller angrenzenden Länder* (Nuremberg, 1524).

W **1525 Fine**
Oronce Fine, *Nova totius Galliae descriptio* (Paris, 1553), printed from the original 1525 blocks.

W **1525 Ptolemy/S**
Strasbourg edition of Ptolemy's *Geography* (1525).

W **1526 Wapowski**
Bernard Wapowski's *Polonia* (Cracow, 1526).

W **1528 Bordone**
Benedetto Bordone, map of England and Wales (Venice, 1528).

W **1528 Lazarus**
Lazarus, *Tabula Hungariae* . . . (Ingolstadt, 1528).

W **1528 Münster**
Sebastian Münster, map of the environs of Heidelberg, in his *Erklerung des newen instruments der sunnen* (Oppenheim, 1528).

W **1532 Ziegler**
Jacob Ziegler, maps of Palestine in his *Qvae intvs continentvr* (Strasbourg, 1532).

W **1533 Rotenhan**
Sebastian von Rotenhan, *Das Francken Landt chorographii Franciae Orie[n]talis* (Ingolstadt, 1533).

MS **1534 Gasser**
Achilles Pirmin Gasser, manuscript map of Algäu (1534). Basel, Öffentliche Bibliothek der Universität, MS. AA 128.

W **1535 Coverdale**
Map of the Holy Land in some copies of Miles Coverdale's translation of the Holy Bible (Cologne?, 1535).

W **1536 Bell'Armato**
Girolamo Bell'Armato (Jérôme Bellarmato), *Chorographia Tvsciae* . . . (1536).

W **1536 Deventer**
Jacob van Deventer, *Dvcatvs Brabantiae* (Antwerp, 1536); reprinted from the original blocks in Antwerp, 1558.

W **1536 Münster**
Sebastian Münster's *Mappa Europae,* from his surviving booklet *Eygentlich fürgebildet aussgelegt und beschribenn* (Frankfurt, 1536).

C **1537 Mercator**
Gerardus Mercator, *Amplissima Terrae Sanctae* (Louvain, 1537).

W **1538 Beke**
Pieter van der Beke, *De charte van Vlandren* (Ghent, 1538).

W **1538 Pagano**
Matteo Pagano, *La vera descriptione de tvto el Piedmente* (Venice, 1538–39).

W **1538 Wissenburg**
Wolfgang Wissenburg, *Descriptio Palestinae nova* (Basel, 1538).

W **1539 Olaus**
Olaus Magnus, *Carta marina* (Venice, 1539).

APPENDIX 21.1 (*continued*)

C **1540 Mercator**
Gerardus Mercator, *Vlanderen. exactissima [Flandriae descriptio]* (Louvain, ca. 1540).

W **1540 Münster**
Sebastian Münster, *Rheniet* (in four maps), 1540.

W **1540 Ptolemy/B**
Sebastian Münster's edition of Ptolemy's *Geography* (Basel, 1540).

W **1542 Honter**
Johannes Honter, maps (Germany, Palestine, and Syria) from his *Rudimenta cosmographica* (Kronstadt, 1542). Blocks cut by Honter.

W **1542 Zell**
Heinrich Zell, map of Prussia ([Nuremberg?], 1542).

W **1543 Anthonisz.**
Cornelis Anthonisz., *Caerte van Oostlandt*. First printed in 1543 but extant only in a 1560 edition, which is likely, however, to have been printed from the original blocks (cut by Anthonisz.).

C **1543 Deventer**
Jacob van Deventer, *Geldria* (1543).

C **1544 Gastaldi**
Giacomo Gastaldi, *La Spaña* (Venice, 1544).

W **1545 Deventer**
Jacob van Deventer, *Frieslandt* (Antwerp, 1559), probably reprinted from the original blocks of 1545.

C **1545 Gastaldi**
Giacomo Gastaldi, *Isola della Sicilia* (1545), probably engraved by Gastaldi.

W **1545/18 Münster/Cl**
Sebastian Münster's version of Nicolaus Claudianus's woodcut map of Bohemia of 1518, which Münster added in 1545 to the *Geography* and (with a slightly different key) to the *Cosmography*.

C **1546 Lily**
George Lily, *Britanniae insulae quae nunc Angliae et Scotiae regna continet cum Hibernia adiacente nova descriptio* (Rome, 1546).

MS **1547 Rogers**
John Rogers, Survey II of Boulogne (1547). BL, Cotton MS. Aug.I.ii.77.

C **1547 Volpaia**
Eufrosino della Volpaia, map of the Roman Campagna (Venice?, 1547).

W **1548 Stumpf**
Johannes Stumpf, *Gallia oder Frankenreych,* in his *Gemeiner loblicher Eydgnoschafft Stetten, Landen vnd Völckeren Chronick* (Zurich, 1548).

W **1550 Pagano**
Matteo Pagano, *Tuto el côtado di Zara e Sebenicho* (Venice, ca. 1550).

C **1551 Cock**
Anonymous map, *Genvina descriptio totius ditionis Parmenensis,* engraved by Hieronymus Cock, presumably printed in Antwerp and dated 1551.

C **1552 Cock**
Anonymous map, *Nova descriptio regionis pedemontanae,* engraved by Hieronymus Cock (Antwerp, 1552).

W **1552 Sabbadino**
Cristoforo Sabbadino, map of the area around Padua and the Lower Trivignia (ca. 1552).

C **1552 Sophianos**
Nikolaos Sophianos's woodcut *Totius Graeciae descriptio* (Basle: Johannes Oporin, 1545) was known until recently only from the copperplate printed in Rome in 1552 by Sophianos himself, possibly from plates used in a now-lost first edition (Rome, 1540–42).

C **1554 Mercator**
Gerardus Mercator, map of Europe (Duisburg, 1554). Engraved by Mercator.

W **1555 Gastaldi**
Giacomo Gastaldi, *Il Piamonte* (Venice, 1555). Blocks presumably cut by Matteo Pagano.

C **1555/40 Tram/Me**
Michele Tramezzino's edition of Gerardus Mercator's map of Flanders (1540). Printed in Venice in 1555.

W **1555 Vopel**
Caspar Vopel, map of the Rhine (Cologne, 1555).

APPENDIX 21.1 (*continued*)

C **1556 Gastaldi**
Reduced copperplate copy of Giacomo Gastaldi's 1555 woodcut map of Piedmont (Venice, 1556). Engraved by Fabio Licinio.

W **1556 Lazius**
Wolfgang Lazius, *Regni Hvngariae descriptio vera* (Vienna, 1556).

W **1556/46 Valvassore/L**
Giovanni Andrea Valvassore's version, *Britanniae insulae quae Angliae et Scotiae regna continet cum Hibernia adiacente nova descriptio* (Venice, 1556), of George Lily's copperplate map of 1546.

C **1557 Stella**
Tilemann Stella, *Itinera Israelitarvm ex Aegypto* (Wittenberg, 1557; second state, 1559).

W **1557 Valvassore**
Giovanni Andrea Valvassore, *La vera descrittione del Friuli, & patria,* printed in Venice in 1557; may have been based on a manuscript map made by Gregorio Amaseo in 1511.

C **1557 Ziletti**
Anonymous map of the Regno di Napoli, engraved at Venice in 1557 by Giordano Ziletti.

W **1559 Jordanus**
Marcus Jordanus, map of the province of Holstein, *Holsatiae* (Hamburg, 1559).

C **1560 Deventer**
Jacob van Deventer, *Zelandia. Zelandia inferioris, Germaniae pars* (Antwerp, 1560).

W **1560 Jolivet**
Jean Jolivet, *Nouvelle description des Gaules* (Paris, 1560).

W **1560 Simeoni**
Gabriele Simeoni, *La Limagna d'Overnia* [Auvergne] (Lyons, 1560).

C **1560 Sorte**
Cristoforo Sorte, map of the territory of Brescia (Venice, 1560).

C **1561 Forlani**
Paolo Forlani, *Lombardia* (Venice, 1561).

C **1561 Gastaldi/A**
Giacomo Gastaldi, *Il desegno della seconda parte dell'Asia* (Venice, 1561).

C **1561 Gastaldi/I**
Giacomo Gastaldi, *Italia* (Venice, 1561). Engraved by Fabio Licinio.

W **1561 Helwig**
Martin Helwig, map of Silesia (Breslau, 1561). H. Kron cut the blocks.

I **1561 Lazius**
Wolfgang Lazius, map of Austria (Vienna, 1561). Lazius himself etched the eleven provincial maps on iron plates.

C **1562 Forlani**
Paolo Forlani, *Descrittione del Ducato di Savoia* (Venice, 1600). Reprinted with minor alterations from the plate first engraved by Forlani in 1560; also reprinted in 1562.

C **1562 Gastaldi**
Giacomo Gastaldi, map of Russia (Venice, 1562). Probably engraved by Paolo Forlani.

W **1562 Grodecki**
Wacław Grodecki's map of Poland was made in 1557 but not printed until about 1562, in Basle.

C **1563 Ligorio**
Pirro Ligorio, *La nova descrittione di tutta la patria del Friuli* (Rome, 1563). Engraved by Sebastiano di Re.

C **1563 Porębski**
Stanislaw Porębski, Duchy of Oświęcim ([Auschwitz], 1563).

C **1563 Sgrooten**
Christiaan Sgrooten's *Nova celeberrimi dvcatvs Geldriae* (Paris, 1563) is extant only in a 1601 printing made from the original plates.

C **1564 Gastaldi**
Giacomo Gastaldi, . . . *Provincia di Natolia* (Venice, 1564). Engraved by Sebastiano di Re.

C **1564 Luchini**
Vincenzo Luchini, *La Marca d'Ancona* (Rome, 1564).

C **1564 Mercator**
Gerardus Mercator, *Angliae, Scotiae & Hibernie nova descriptio* (Duisburg, 1564).

C **1565/40 Jode/Me**
Gerard de Jode's version of Gerardus Mercator's map of Flanders of 1540 (Antwerp, 1565).

APPENDIX 21.1 (*continued*)

MS **1565 Tschudi**
Aegidius Tschudi, draft map of Switzerland of about 1565. Intended as a revision of his map of 1538 but never published.

C **1566 Forlani**
Paolo Forlani (attributed), *La nvova et esatta descrittione de la Soria, e della Terra Santa* (Venice, 1566).

C **1567 Criginger**
Johannes Criginger's map of Saxony is unknown in its original state, but the anonymous *Chorographia nova Misniae et Thvringiae* (1567), probably engraved by Balthasar Jenichen, is thought to have been based on it.

C **1567 Gastaldi**
Giacomo Gastaldi, *La descriptione dela Pvglia* (Venice, 1567).

W **1568 Apian**
Philipp Apian, *Bairische landtaflen* [Bavaria] (Munich and Ingolstadt, 1568).

C **1568 Gastaldi**
Giacomo Gastaldi, map of the territory of Padua and Treviso (1568).

C **1569 Fabricius**
Paul Fabricius, map of Moravia (Venice, 1569).

W **1569/62 Pograbski/Gr**
Andrea Pograbski's *Pars sarmantiae Evropae* [Poland] (Venice, 1569) was a revision of Wacław Grodecki's map of Poland (1562).

C **1570/50 Forlani/Pa**
Paolo Forlani's version of Matteo Pagano's woodcut map of Zara of 1550, here called *La uera & fidele discrittione di tutto il Contado di Zara & Sebenico* (Venice, 1570).

C **1570 Gastaldi**
Giacomo Gastaldi, *La nova descrition della Lombardia* (Rome, 1570). Engraved by Giorgio Tilman. Gastaldi had been granted a privilege in 1559, but 1570 is the earliest such a map can be attested.

C **1570/23 Ortelius/Av**
Abraham Ortelius's version (1570) of Johannes Aventinus's woodcut map of Bavaria of 1533 (a corrected version of the original of 1523), here called *Typus Vindeliciae sive utrivsque Bavaria.*

C **1570/67 Ortelius/Cr**
Abraham Ortelius's version (1570) of Johannes Criginger's map of Saxony of 1567, here called *Saxoniae, Misniae, Thvringiae.*

C **1570/68 Ortelius/Cr**
Abraham Ortelius's version (1570) of Johannes Criginger's map of Bohemia of 1567 or 1568, here called *Regni Bohemiae descriptio.*

C **1570/60 Ortelius/De**
Abraham Ortelius's version (1570) of Jacob van Deventer's map of Zeeland of 1560 (or of the 1546 original), here called *Zelandicarvm insvlarvm exactissima et nova descriptio.*

C **1570/55 Ortelius/Ga**
Abraham Ortelius's version (1570) of Giacomo Gastaldi's woodcut map of Piedmont (1555), here called *Pedemontanae vicinorvmqve regionvm.*

C **1570/61 Ortelius/He**
Abraham Ortelius's version (1570) of Martin Helwig's woodcut map of Silesia of 1561, here called *Silesia typvs descriptvs.*

C **1570/40 Ortelius/Me**
Abraham Ortelius's version (1570) of Gerardus Mercator's map of Flanders of 1540, here called *Flandriae.*

C **1570/60 Ortelius/Si**
Abraham Ortelius's version (1570) of Gabriele Simeoni's woodcut map of Auvergne of 1560, considerably altered and called *Limaniae topographia.*

C **1570/42 Ortelius/Ze**
Abraham Ortelius's version (1570) of Heinrich Zell's woodcut map of Prussia of 1542, here called *Prussia descriptio.*

C **1570 Sgrooten**
Christiaan Sgrooten's *Noua descriptio amplissimae Sanctae Terrae* (1570) was a reworking of the map Peter Laicksteen had drafted after his visit to Palestine in 1556.

C **1570 Stella**
Tilemann Stella's *Mansfeldiae, Saxoniae totius* was drawn in 1561 but engraved, by Frans Hogenberg, only in 1570.

W **1571 Campi**
Antonio Campi, *Tvtto il Cremonese et soi confini et sua diocese,* 1571; reprinted in 1583, probably from the original blocks.

APPENDIX 21.1 (*continued*)

C **1571/70 Mell/St**
Johannes Mellinger's version (Jena, Germany, 1571) of Tilemann Stella's map of the county of Mansfeld (1570).

C **1573/69 Ortelius/Fa**
Abraham Ortelius's version (1573) of Paul Fabricius's map of Moravia of 1569, here called *Moraviae.*

C **1573/70 Ortelius/St**
Abraham Ortelius's version (1573) of Tilemann Stella's map of Mansfeld of 1570.

MS **1573 Sgrooten**
Christiaan Sgrooten, "Ducaus Geldriae et Cliviae," from Sgrooten's atlas of Germany and the Low Countries of 1573.

C **1574 Brognoli**
Bernardino Brognoli, map of the territory of Verona (Venice, 1574). Probably engraved by Paolo Forlani.

C **1575 Saxton/Do**
Christopher Saxon, map of the county of Dorset (1575).

C **1575 Saxton/Ha**
Christopher Saxton, map of the county of Hampshire (1575). Engraved by Lenaert Terwoort.

C **1575 Saxton/Ke**
Christopher Saxton, map of the counties of Kent, Sussex, Surrey, and Middlesex (1575). Engraved by Frans Hogenberg.

C **1575 Saxton/St**
Christopher Saxton, map of the county of Somerset (1575). Engraved by Lenaert Terwoort.

C **1576 Saxton/Cu**
Christopher Saxton, map of the counties of Cumberland and Westmoreland (1576). Engraved by Augustine Ryther.

C **1576 Saxton/Du**
Christopher Saxton, map of the county of Durham (1576). Engraved by Augustine Ryther.

C **1576 Saxton/Li**
Christopher Saxton, map of the counties of Lincolnshire and Nottinghamshire (1576). Engraved by Remigius Hogenberg.

C **1576 Saxton/Wi**
Christopher Saxton, map of the county of Wiltshire (1576). Engraved by Frans Hogenberg.

C **1577 Saxton/Ch**
Christopher Saxton, map of the county of Cheshire (1577). Engraved by Francis Scatter.

C **1577 Saxton/De**
Christopher Saxton, map of the county of Derbyshire (1577).

C **1577 Saxton/He**
Christopher Saxton, map of the county of Hertforshire (1577). Engraved by Nicholas Reynolds.

C **1577 Saxton/La**
Christopher Saxton, map of the county of Lancashire (1577). Engraved by Frans Hogenberg.

C **1577 Saxton/Yo**
Christopher Saxton, map of the county of Yorkshire (1577). Engraved by Augustine Ryther.

C **1578/36 Jode/Be**
Gerard de Jode's version of Girolomo Bell'Armato's woodcut map of Tuscany of 1536 (Antwerp, 1578).

C **1578/69 Jode/Fa**
Gerard de Jode's version (1578) of Paul Fabricius's map of Moravia of 1569 (Antwerp, 1578).

C **1578/68 Jode/Ga**
Gerard de Jode's version (1578) of Giacomo Gastaldi's map of the Padua and Treviso region of 1568 (Antwerp, 1578).

C **1578/52 Jode/Hi**
Gerard de Jode's version (1578) of Augustin Hirschvogel's woodcut map of Hungary of 1552 (Antwerp, 1578).

C **1578/55/40 Jode/Tr/Me**
Gerard de Jode's version (1578) of Michele Tramezzino's version (1555) of Gerardus Mercator's map of Flanders of 1540 (Antwerp, 1578).

C **1578 Saxton/Gl**
Christopher Saxton, map of the county of Glamorgan (1578).

C **1578 Saxton/Pe**
Christopher Saxton, map of the county of Pembrokeshire (1578).

C **1579 Ortelius/Gu**
Abraham Ortelius's version (1579) of Licinio Gueto's map of Anjou, *Andegavensium ditionis vera et integra descriptio,* of 1579.

C **1580 Danti**
Egnazio Danti, map of the territory of Perugia (Rome, 1580). Engraved by Mario Cartaro.

APPENDIX 21.1 (*continued*)

C **1580 Lafreri**
Anonymous map, *Regno di Napoli,* published by Antonio Lafreri (Antoine Lafréry) (Venice, 1580).

C **1583 Danti**
Egnazio Danti, map of the territory of Orvieto (Rome, 1583).

C **1584/84 Ortelius/He**
Caspar Henneberger's map of Prussia, drawn in Mulhouse in 1584, was used in the same year by Abraham Ortelius with the title *Prussia regionis Sarmantiae Europae. . . .*

C **1585 Mercator/An**
Gerardus Mercator, *Aniov* (Duisburg, 1585). From the first part of his atlas, *Tabulae geographicae Galliae, Belgii inferioris et Germaniae.*

C **1585 Mercator/Br**
Gerardus Mercator, *Brabantia, Gvlick et Cleve* (Duisburg, 1585). From the first part of his atlas, *Tabulae geographicae Galliae, Belgii inferioris et Germaniae.*

C **1587 Bonifacio**
Natale Bonifacio, *La provincia ulteriore d'Abruzzi* (Rome, 1587). Engraved by Nicola van Aelst.

C **1589 Mercator/It**
Gerardus Mercator, *Italia* (Duisburg, 1589). From the second part of Mercator's atlas *Italiae, Slavoniae, et Graeciae tabulae geographicae.*

C **1589 Mercator/Lo**
Gerardus Mercator, *Ramandiola cum Parmensi Ducata* (Duisburg, 1589). From the second part of Mercator's atlas *Italiae, Slavoniae, et Graeciae tabulae geographicae.*

C **1589 Strubicz**
Matthias Strubicz, *Magni ducatus Luthuaniae, Livoniae, et Moscoviae descriptio,* in *Varmiensis episcopi Polonia; siue, De origine et rebvs gestis Polonorvm libri XXX,* by Martin Kromer (Cologne, 1589). Possibly engraved by Gerardus Mercator.

C **1590 Bonifacio**
Natale Bonifacio, map of the Holy Land (Rome, 1590).

C **1590 Du Temps**
Jean du Temps, *Description du pais Blaisois* (Tours, 1590). Engraved by Gabriel I Tavernier (Tours, 1594).

C **1591 Bompar**
Pierre-Jean Bompar, *Accvratissima Patriae Provinciae descriptio* (1591). Engraved by Jacques de Fornazeris in either Lyons or Turin.

C **1592 François**
Isaac François, map of Tourraine (Tours, 1592). Engraved by Gabriel I Tavernier (Tours, 1594).

C **1593 Adrichem**
Christiaan van Adrichem, *Situs terrae promissionis,* in his *Theatrum Terrae Sanctae et biblicarum historiarum* (Cologne, 1590).

C **1593 Norden**
John Norden, map of Middlesex, from his *Specvlvm Britanniae: The First Parte an Historicall, & Chorographicall Discription of Middlesex* (London, 1593).

W **1593 Scultetus**
Bartholomäus Scultetus, *Lusatiae Superioris* [Upper Lusatia] (Görlitz, 1593). Blocks cut by Scultetus.

C **1593 White**
William White's map of the Isle of Wight, now lost, was drawn about 1593, but the map published by John Speed in 1611 appears to be faithful to the original, at least as far as the signs are concerned.

C **1594/91 Boug/Bom**
Maurice Bouguereau's version of Pierre-Jean Bompar's map of Provence (1591).

C **1594/79/79 Boug/Or/Gu**
Maurice Bouguereau's version (1594) of Abraham Ortelius's version (1579) of Licinio Gueto's map of Anjou (Tours, 1579). Engraved by Gabriel I Tavernier.

C **1594/70/60 Boug/Or/Si**
Maurice Bouguereau's version (1594) of Abraham Ortelius's version (1570) of Gabriele Simeoni's woodcut map of Auvergne of 1560 (Tours, 1594). Engraved by Gabriel I Tavernier.

C **1594 Fayen**
Jean Fayen, *Totius Lemovici* [Limousin] (Tours, 1594). Engraved by Gabriel I Tavernier.

C **1594 Norden**
John Norden, *Surrey* (London, 1594). Engraved by Charles Whitwell.

C **1595 Magini/Bo**
Giovanni Antonio Magini, *Territorio Bolognese* (Bologna, 1595).

APPENDIX 21.1 (*continued*)

C **1595 Magini/Ro**
Giovanni Antonio Magini, *Polesino di Rovigo* (Bologna, 1595).

C **1595 Norden/Ha**
John Norden, *Hamshire* (London, 1595).

C **1595 Norden/Su**
John Norden, *Sussex* (London, 1595). Engraved by Christopher Schwytzer (Switzer).

C **1595/91 Ortelius/Bo**
Abraham Ortelius's version of Pierre-Jean Bompar's map of Provence of 1591, *Provinciae, Regionis Galliae,* was published in the *Additamentum Quinta* in 1595, although the map is dated 1594.

MS **1596 Norden/Co**
John Norden, draft maps for *The Generall Description of Cornwall* (one county map and nine maps of the Hundreds). Cambridge, Trinity College, MS. 0.4.19.

C **1596 Symonson**
Philip Symonson, *Kent* (1596). Engraved by Charles Whitwell.

C **1597 Magini**
Giovanni Antonio Magini, *Romagna* (Bologna, 1597).

C **1597 Parenti**
Gellio Parenti, map of the territory of Spoleto (1597).

C **1598 Norden**
John Norden, *Hartford shire* (London, 1598). Engraved by William Kip.

C **1598 Ortelius/Gu**
Abraham Ortelius's posthumously published version of François de La Guillotière's map *L'Isle de France: Parisiensis agri descrip,* drawn in the same year.

C **1599 Boazio**
Baptista Boazio, *Irelande* (London, 1599). Engraved by Renold Elstracke.

C **1600 Sprecher**
Fortunat Sprecher von Bernegg, *Alpinae seu Foederatae Rhaetiae* (Venice, ca. 1600).

C **1600 Valegio**
Anonymous, *Disegna della Valtellina ey svoi confini* (Venice, ca. 1600). Engraved by Francesco Valegio.

C **1602 Duchetti**
Anonymous map of Siena and district engraved by Claudio Duchetti (Rome, 1602).

MS **1602 Smith/He**
William Smith, map of the county of Hertfordshire ([London], 1602) (the original date on the manuscript, later crossed out and updated to 1603 for printing).

C **1602 Smith/Ex**
William Smith, map of the county of Essex ([London], 1602). Engraved by Hans Woutneel.

C **1602 Smith/Su**
William Smith, map of the county of Surrey ([London], 1602 or 1603).

C **1603 Smith/He**
William Smith, map of the county of Hertfordshire ([London], 1603).

C **1603 Smith/St**
William Smith, map of the county of Staffordshire ([London], 1603).

C **1603 Smith/Wa**
William Smith, map of the county of Warwickshire ([London], 1603).

MS **1603 Smith/Wo**
William Smith, map of the county of Worcestershire ([London], 1603).

C **1603 Smith/Wo**
William Smith, map of the county of Worcestershire ([London], 1603).

C **1605 Fabert**
Abraham Fabert, *Description du Pays Messin* [Metz] (1605).

C **1608 Magini**
Giovanni Antonio Magini, *Italia nuova* (Bologna, 1608).

C **1610 Speed/No**
John Speed, map of the county of Northumberland (London, 1610).

C **1610 Speed/Su**
John Speed, map of the county of Sussex (London, 1610). Engraved by Jodocus Hondius the Elder.

APPENDIX 21.1 (*continued*)

C **1611/08 Ho/Go**
Jodocus Hondius the Elder's version (1611) of Jacques Goulart's *Chorographica tabula Lacus Lemanni* of 1608.

C **1611/1585 Ho/Me/Fl**
Jodocus Hondius the Elder's version (1611) of Gerardus Mercator's map of Flanders in the first part of Mercator's atlas, *Tabulae geographicae Galliae, Belgii inferioris et Germaniae* (1585).

C **1611/1585 Ho/Me/Z**
Jodocus Hondius the Elder's version (1611) of Gerardus Mercator's map of Zeeland in first part of Mercator's atlas, *Tabulae geographicae Galliae, Belgii inferioris et Germaniae* (1585).

C **1611 Speed/Ch**
John Speed, map of the county of Cheshire (London, by 1611).

C **1611 Speed/Ha**
John Speed, map of the county of Hampshire (London, by 1611). Engraved by Jodocus Hondius the Elder.

C **1611 Speed/So**
John Speed, map of the county of Somerset (London, by 1611).

C **1611 Speed/Wi**
John Speed, map of the county of Wiltshire (London, by 1611).

C **1613 Radziwill**
Prince Nicholas Christopher Radziwill, *Magni ducatus Lithuaniae* (Amsterdam, 1613). The map may have been drafted by Thomas Makowski but was engraved by Hessel Gerritsz.

C **1613/1543 Veen/Anth**
Adriaen Veen, *Nautius Sueciae* (Amsterdam, 1613). Copied from Cornelis Anthonisz.'s *Oostlandt* (1543) and engraved by Jodocus Hondius the Elder.

C **1616 Templeux**
Damien de Templeux, *Carte de pays de Champaigne* (Paris, 1616).

C **1617/05 Lecl/Fa**
Jean IV Leclerc's version of Abraham Fabert's map of Metz of 1605 (Paris, 1617).

C **1617 Mauro**
Jubilio Mauro, *Sabina* (Rome, 1617). Engraved by Giovanni Maggi.

C **1618/1570/69 Ke/Or/Cr**
Pieter van den Keere's version of Ortelius's version (1570) of Johannes Criginger's map of Bohemia of 1569. Van den Keere's map, called *Regni Bohemiae nova descriptio,* was engraved in Amsterdam in 1618 by Van den Keere.

C **1618/00 Sprecher**
A close copy of Fortunat Sprecher von Bernegg's map *Rhaetiae* (ca. 1600) was engraved in 1618 by Nicolaas van Geelkercken. One of the main differences is in the rendering of mountains and hills.

C **1619 Aretinus**
Paulus Aretinus, *Regni Bohemiae nova et exacta descriptio* (1619).

C **1619/1595/91 Lecl/Or/Bo**
Jean IV Leclerc's copy of Abraham Ortelius's version (1595) of Pierre-Jean Bompar's map of Provence of 1591, now called *Provinciae, regionis Galliae, vera/exactissimaq[ue] descriptio* (Paris, 1619). Engraved by Hugues Picart.

C **1619/1598 Lecl/Or/Gu**
Jean IV Leclerc's version (1619) of Abraham Ortelius's version of François de La Guillotière's map of the Île-de-France of 1598. Engraved by François van den Hoeye.

C **1619 Templeux**
Damien de Templeux, *Description de Beauvaisois* (Paris, 1619).

C **1620 Lavanha**
João Baptista Lavanha, map of Aragon (Zaragoza, completed 1616), published only in or by early 1620. Engraved by Diego de Astor.

C **1620 Leclerc**
Anonymous, *Carte du pais Loudunois,* dated 1620. Engraved by [H.] Piquet for Leclerc's atlas.

C **1620 Magini**
Giovanni Antonio Magini, *Puglia* (Bologna, 1620).

C **1621 Jubrien**
Jean Jubrien, *Carte de pais de Retelois* [Rethel] (Paris, 1621). Engraved by Hugues Picart.

C **1621 Leclerc**
Anonymous, *Carte du pais d'Aunis et gouverme[n]t de La Rochelle* (Paris, 1621). Engraved by [H.] Piquet.

C **1623 Jubrien**
Jean Jubrien, *Carte du pays et diocèse de Rheims* (Paris, 1623).

APPENDIX 21.1 (*continued*)

C **1625 Gigas/M**
Johannes Michael Gigas (Gigantes), *Monasteriensis Episcopatus* (Amsterdam, ca. 1625).

C **1625 Gigas/P**
Johannes Michael Gigas, *Episcopatus Paderbornensis,* probably published about 1625.

C **1626 Beins**
Jean de Beins, *Carte et description generale de Dauphine* (Paris, 1626).

C **1626 Scultetus**
Jonas Scultetus, *Geographica descriptio comitatis Glacensis* [Glatz] (Breslau, 1626).

C **1627 Comenius**
Johann Amos Comenius (Komenský), *Moraviae nova* (Amsterdam, 1627). Engraved by Abraham Goos (Kuchar, 1961).

C **1629/1584 Ho/He**
Jodocus Hondius the Elder's version (1629) of Caspar Henneberger's map of Prussia of 1584.

C **1629/00 Visscher/Sp**
Claes Jansz. Visscher's close copy (1629) of Fortunat Sprecher von Bernegg's map *Rhaetae* of about 1600.

C **1630/18/etc. Jans/Ke**
Johannes Janssonius's version (1630) of Pieter van den Keere's version (1618) of Abraham Ortelius's version (1570) of Johann Criginger's map of Bohemia of 1567 or 1568.

C **1631/1570/60 Bl/Or/Si**
Willem Jansz. Blaeu's version (Amsterdam, 1631) of Abraham Ortelius's version (1570) of Gabriele Simeoni's woodcut map of the Auvergne of 1560.

C **1634 Tassin/Or**
Christophe Tassin, *Carte du duché d'Orleans* (Paris, 1634).

C **1634 Tassin/Po**
Christophe Tassin, *Carte generale de Poictou, Xaintonge Angoulemois et pays d'Aulnix* (Paris, 1634).

C **1635/29/etc. Bl/Ho**
Willem Jansz. Blaeu's version (1635) of Jodocus Hondius the Elder's version (1629) of Caspar Henneberger's map of Prussia as published by Abraham Ortelius in 1584.

C **1635 Langren**
Michael Florent van Langren, first and second parts of the map of Brabant (Amsterdam, 1635).

C **1636/1540 Ho/Me**
Henricus Hondius's version (Amsterdam, 1636) of Gerardus Mercator's map of Flanders (1540). Engraved by Henricus Hondius.

C **1636/13 Ho/Ra**
Henricus Hondius's version of Nicholas Christopher Radziwill's map of Lithuania of 1613 (Amsterdam, 1636).

C **1637 Tassin/Bo**
Christophe Tassin, *Boulonnois, Pontieu Artois* . . . (Paris, 1637).

C **1637 Tassin/Ha**
Christophe Tassin, *Hainault, Cambrensis et chastellenie de Douay* (Paris, 1637).

C **1638/1593 Bl/Sc**
Joan Blaeu's version of Bartholomäus Scultetus's woodcut map of Upper Lusatia of 1593 (Amsterdam, 1638). Engraved by Joan Blaeu.

C **1643/30/etc. Bl/Ja**
Willem Jansz. and Joan Blaeu's version (1643) of Johannes Janssonius's version (1630) of Pieter van den Keere's version (1618) of Abraham Ortelius's version (1570) of Johannes Criginger's map of Bohemia of 1569.

C **1647/30 Bl/Sc**
Joan and Cornelis Blaeu's version (Amsterdam, 1647) of Jonas Scultetus's map of Lower Silesia of about 1630.

C **1647/00 Bl/Sp**
Joan Blaeu's version (1647) of Fortunat Sprecher von Bernegg's *Alpinae seu Foederatae Rhaetiae* (Venice, ca. 1600).

C **1649/13 Bl/Ra**
Joan Blaeu's version of Nicholas Christopher Radziwill's map of Lithuania of 1613 (Amsterdam, 1649).