THE ART, SCIENCE, AND TECHNOLOGY
OF MEDIEVAL TRAVEL

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The Art, Science, and Technology of Medieval Travel

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Contents

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List of Figures

Unless otherwise indicated, all illustrations and photographs are by the authors.

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The Art, Science, and Technology of Medieval Travel

Robert Bork and Andrea Kann

Travel has played a central role in social organization throughout human history. Today, in the early twenty-first century, travel and telecommunications link many of the world's inhabitants into a "global village." Individuals, corporations, and states all act on a global stage, thanks largely to modern technological developments in aeronautics, electronics, and computer technology. The shapes of modern American cities that grew up after the popularization of the automobile, meanwhile, differ radically from those of older cities that grew principally in response to human and animal traffic. The interaction between travel technologies and social structure, of course, has never been a one-way street. Governmental policies and social habits can constrain and inflect the way in which travel technologies are used. In modern North Korea, the dictatorial regime keeps its citizens effectively isolated from the rest of the world, actively suppressing the opportunities for travel and communication that modern technology has created. In the heyday of the Roman Empire, conversely, a respectably large segment of the upper and professional class was free to travel throughout the politically unified Mediterranean basin, despite the comparatively primitive state of travel technology in Antiquity.

In the Middle Ages, long-distance travel was less common than it is in the modern world, or than it was in the Roman world. As the power of Rome weakened, travel networks broke down, and the relatively homogenous upper-class culture of the Mediterranean world began to fragment. The progressive subdivision of the Christian Church into eastern and western halves, and the spread of Islam across North Africa, led to the emergence of civilizations separated by significant religious, cultural, and linguistic barriers. Travel nevertheless remained important in the medieval world.[1] Scholarly accounts of medieval history have long recognized the crucial importance of pilgrimage and crusade, two modes of travel closely linked

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[1] Basic works on medieval travel include more general scholarship on the movements, patterns and habits of those on journeys. These include recent studies such as: Jean Verdon, *Travel in the Middle Ages*, trans. George Holoch (Notre Dame, IN, 2003); Brian Paul Hindle, *Medieval Roads and Tracks* (Princes Risborough, 1998); Norbert Öhler, *The Medieval Traveller*, trans. Caroline Hiller (Woodbridge, Suffolk, 1989); Marjorie Rowling, *Everyday Life of Medieval Travellers* (New York, 1989); and Margaret Wade Labarge, *Medieval Travellers: The Rich and Restless* (London, 1982).

with Christian piety in a stereotypically medieval way.[2] The daring voyages of the Vikings into the North Atlantic and the travels of Marco Polo into China have also earned deservedly prominent places in histories of medieval travel, exploration, and cultural exchange.[3] Equally important, if less spectacular, was the steady growth of commercial travel within Europe, especially in the centuries after the millennium. The growth of trade furthered the growth of cities, which in turn became more desirable as travel destinations. By the late Middle Ages, in fact, the growth of trade organizations like the German Hanse fostered urbanization in northern European territories that had never been economically or culturally integrated into the Roman world.[4] And, of course, the expansion of trade networks helped to motivate the voyages of exploration that assured Europe's central role in world history after 1500. As these examples demonstrate, changing patterns of travel contributed significantly to the shaping of medieval history.

On a more personal level, many citizens of the medieval world clearly understood that travel experiences could foster the growth of wisdom, as the fourteenth-century poet Eustache Deschamps suggested:

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2 Scholarly attention turned to the Crusades starting already in the early 19th century, following Napoleon's campaigns in the Near East. A crucial early work in this tradition was Joseph François Michaud, *Histoire des Croisades* (7 vols., Paris, 1812–22). By the middle of the 19th century, pilgrimage had also begun to achieve scholarly prominence, with the publication of works such as Louis de Sivry and Jean-Baptiste-Joseph Champagnac, *Dictionnaire géographique, historique, descriptif, archéologique des pèlerinages: anciens et modernes et des lieux de devotion les plus célèbres de l'univers* (2 vols., Paris, 1850–51). The subsequent explosion of scholarship on these topics defies easy synopsis, but recent treatments of both can be found in Barbara N. Sargent-Baur (ed.), *Journeys Toward God: Pilgrimage and Crusade* (Kalamazoo, MI, 1992). Among many more specialized studies on pilgrimage, several books stand out for their broad sociological scope. See, for example: Jonathan Sumption, *The Age of Pilgrimage: An Image of Medieval Religion* (Totowa, NJ, 1975); Victor and Edith Turner, *Image and Pilgrimage in Christian Culture: Anthropological Perspectives* (New York, 1978); *Contesting the Sacred: The Anthropology of Christian Pilgrimage*, eds. John Eade and Michael Sallnow (London, 1991); and Jennie Stopford (ed.), *Pilgrimage Explored* (Woodbridge, Suffolk, 1999). A comparably broad and deliberately multi-cultural recent addition to the literature on crusade is Carole Hillenbrand, *The Crusades: Islamic Perspectives* (New York, 1999).

3 A well-regarded look at Viking scholarship is Patrick Wormald's "Viking Studies: Whence and Whither?" in R. T. Farrell (ed.), *The Vikings* (London, 1982). More recent studies of the Vikings include Angelo Forte, *Viking Empires* (Cambridge, 2005). Marco Polo's adventures, which were already widely known and celebrated in the later Middle Ages, became more easily accessible to English readers with the publication of Henry Yule, *The Book of Ser Marco Polo the Venetian* (London, 1871). The most recent critical edition of the text is Philippe Ménard (ed.), *Marco Polo: Le devisement du monde* (Geneva, 2001).

4 Phillipe Dollinger, *The German Hanse* (London, 1970).

Ceuls qui ne partent de l'ostel
Sanz aler en divers pais
Ne scevent la dolour mortel
Don't gens qui vont sont envahis
Les maulx, les doubtes, les perilz
Des mers, des fleuves et de pas,
Les langaiges qu'om n'entent pas,
La paine et le traveil des corps.
Mais combine qu'om soit de ce las:
Il ne scet rien qui ne va hors.
Those folk who've never left their home
who have never been in countries not their own,
don't know the misery, the pain
the suffering, of those who go:
the hardships, perils, fear and strain,
from rivers, mountain passes, seas,
the languages you do not know,
the body's torment and disease.
But, weary though one gets of these,
a man knows nothing who hasn't been overseas.[5]

Many accounts from travelers real and imaginary guide our understanding of what a journey might have been like from the earliest part of the Middle Ages. The range of such documents is quite broad, from itineraries, travel accounts and diaries to guidebooks, devotional accompaniments and indulgence books.[6] One of the first of these written accounts comes from the pen of the "Bordeaux Pilgrim," a traveler who set out from France to the Holy Land early in the fourth century.[7] This Latin text is essentially a glorified itinerary, with a list of places and sites along the road from Bordeaux to Jerusalem. And yet, when the Holy Land is reached, this pilgrim finally is inspired to expand into a description of the sites, carefully linking these holy places to the sacred narratives that offer them deeper meaning. One imagines the traveler writing such an account for those still at home, perhaps those who may be thinking of making the journey, or those who are unable to do so in reality. The later fourth-century *Peregrinatio* of the early pilgrim Egeria demonstrates a more personalized account of travel to the Holy Land than that offered by the Bordeaux Pilgrim, yet her account is still tightly linked to the holy narratives that give meaning

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5   Ian S. Laurie and Deborah M. Sinnreich-Levi (eds.), *Eustache Deschamps: Selected Poems*, trans. David Curzon and Jeffrey Fiskin (New York, 2003), pp. 192–93.

6   For pilgrimage accounts, see, among many others: J. Richard, *Les Récits de voyages et de pèlerinages* (Turnhout, 1981); Donald Howard, *Writers and Pilgrims: Medieval Pilgrimage Narratives and Their Posterity* (Berkeley, 1980). A brief annotated bibliography of pilgrimage accounts and scholarship on the topic can be found in Linda Kay Davidson and Maryjane Dunn-Wood, *Pilgrimage in the Middle Ages: A Research Guide* (New York, 1993).

7   *Itinerary from Bordeaux to Jerusalem: "The Bordeaux Pilgrim" (333 AD)*, trans. Aubrey Stewart and annotated by Colonel Sir C. W. Wilson (London, 1887).

to the sites along the road. She visits the important sites not for the local color or experience, but rather to recreate the sacred steps of her savior. Her writing is like a letter home in which she wants to evoke in her readers not just what she has seen but, more importantly, its sacred import.[8] In the late seventh century, Adamnan, abbot of Iona and biographer of Saint Columban, recounted Bishop Arculf's pilgrimage experience, being careful to insert Arculf into the text as witness to the existence of the holy sites – Arculf sees a site with his own eyes, or touches his own fingers to any number of sacred symbols and places, making the act of travel tangible as well as perceptual.[9] The multimedia impressions of travel on all the senses would also be evoked by many subsequent medieval writers.

While earlier accounts of pilgrimage are dense with detail about the holiness of sacred locales, later accounts begin to include information on the practical hazards of travel as well as its spiritual rewards. The twelfth-century *Codex Calixtinus*, or *Liber Sancti Jacobi*, for example, describes must-see stops along the road to Santiago de Compostela.[10] As the traveler moves across the countryside saint by saint, relic by relic, the world seems a place of endless wonders – and yet a distinct thread of xenophobia is wound into the tapestry of worship and adventure. The text encourages visits to the remains of various saints, but it cautions the traveler to beware, for example, when crossing the lands of the Navarrese, for these people are "debauched, perverse, perfidious, disloyal and corrupt, libidinous, drunkard, given to all kinds of violence, ferocious and savage, impudent and false, impious and uncouth, cruel and quarrelsome, incapable of anything virtuous, well-informed of all vices and iniquities."[11] Such a description suggests that travel should only be undertaken with a great deal of caution, and reminds the reader that travel may involve encountering not only new sights and sounds, but also new people, some of whom may seem threateningly alien.

The Crusades, of course, witnessed the most dramatic confrontation between Europeans and culturally alien "others." Pope Urban II's 1095 call for the Christian reconquest of Jerusalem marked a new level of militancy and self-confidence on the part of the Church, and the successful occupation of the city four years later led to

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8   For the original Latin text, see: Egeria, *Itinerarium Egeriae*, eds. E. Franceschini and Robert Weber, Corpus Christianorum, Series Latina, 175 (Turnhout, 1953). For English translations and commentary, see John Wilkinson, *Egeria's Travels: Newly Translated (from the Latin) with Supporting Documents and Notes* (London, 1971); and Hagith Sivan, "Holy Land Pilgrimage and Western Audiences: Some Reflections on Egeria and her Circle," *Classical Quarterly*, 38/2 (1988): 528–35. Mary B. Campbell, *The Witness and the Other World: Exotic European Travel Writing, 400–1600* (Ithaca, 1988) places Egeria's travels in the larger context of European travel literature.

9   Adamnan, *Adamnan's "De locis sanctis*," ed. and trans. Denis Meehan, Scriptores Latini Hiberniae 3 (Dublin, 1958).

10   Paula Gerson, Jean Krochalis, Annie Shaver-Crandall and Alison Stones, *The Pilgrim's Guide: A Critical Edition, vol. 1: The Manuscripts, vol. II: The Text* (London, 1998); also *The Pilgrim's Guide to Santiago de Compostela*, ed. and trans. William Melczer (New York, 1992).

11   Translation from Melczer, p. 94.

the installation of a Crusader kingdom that would last nearly two centuries.[12] By the thirteenth century, however, the Crusader project had begun to lose its momentum. When the French King Louis IX set off on crusade between 1248 and 1254, he was unable to persuade the Germans and Italians to forget their animosities and join the expedition, making the crusade primarily a French effort rather than a more unified pan-European force.[13] Louis's military experiences in Egypt and Syria, as recounted in the well-known memoir-cum-saint's life *Histoire de Saint Louis* by Jean de Joinville, still seem largely motivated by piety.[14] In the next century, however, we see efforts to revive the crusading dream colored by more temporal concerns. The Venetian Marino Sanudo clearly was cognizant of the economic effects of such encounters. His plans to recapture the Holy Land are outlined in his *Secreta Fidelium Crucis*, beginning with his strategy to initiate the new crusade with a commercial blockade of trade routes in the eastern Mediterranean.[15] The *Secreta* also includes a history of the Holy Land and the earlier crusades, in addition to elaborate maps that have earned a prominent place in the history of cartography. The broad scope of Marino's travels throughout Europe, the Mediterranean, and the Near East are reflected in his efforts at accuracy and the thorough nature of his text, as he attempted to persuade a western European audience to turn its attention to recapturing the lost territory of the Holy Land.

Written accounts from travelers, historians, and others towards the later Middle Ages explored diverse approaches to describing, chronicling or recording journeys actually taken and those merely imagined. Some authors, like de Joinville or Jean Froissart, the principal chronicler of the Hundred Years' War and the Battle of Nicopolis, provided fairly straightforward, if biased, accounts of events abroad. Froissart's contemporary Geoffrey Chaucer displayed a similarly close attention to realistic details of travel even when writing literary fictions such as the *Canterbury Tales*. But other accounts grow to be as curious and colorful as the lands and peoples

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12   A crucial study of the ideology of crusade is Carl Erdmann, *The Origin of the Idea of Crusade*, trans. Marshall W. Baldwin and Walter Goffart, foreword and additional notes by Marshall W. Baldwin (Princeton, 1977), originally published in German in 1935.

13   For crusading during Louis's reign, see, among others: S. Lloyd, "The Crusades of St Louis," *History Today*, 47/5 (1997): 37–43; Caroline Smith, *Crusading in the Age of Joinville* (Aldershot, 2006).

14   Joinville's text can be found in a variety of modern editions, among them: *The History of St. Louis, by Jean, Sire de Joinville*, trans. Joan Evans, from the French text edited by Natalis de Wailly (London, 1938). For another contemporary French account of Louis's efforts, see *Crusader Syria in the Thirteenth Century: The Rothelin Continuation of the History of William of Tyre with part of the Eracles or Acre text*, trans. J. Shirley (Aldershot, 1999). Smith (see note 13 above) suggests that Joinville's text is less straightforward and more full of textual conventions borrowed from literature than many have assumed.

15   C. J. Tyerman, "Marino Sanudo Torsello and the Lost Crusade: Lobbying in the Fourteenth Century: The Alexander Prize Essay," *Transactions of the Royal Historical Society*, 32 (1982): 57–73. Aziz Atiya, *The Crusade in the Later Middle Ages* 2nd edn. (New York, 1970) [original text in 1938] addresses Sanudo's contribution in a synthetic approach to gathering sources that presents the ongoing desire for crusading beyond the actual expeditions.

they describe. Both Marco Polo's travelogue and the book of John Mandeville, for example, portray various beasts and peoples who are monstrous in appearance and behavior, as well as foreign civilizations that appear to be as proper and devotionally correct as those in western Christendom.[16] To provide a sense of authenticity, such narratives often incorporate descriptive commentary on the sights, sounds, tastes, and creatures encountered along the way. The intrepid fifteenth-century pilgrim Friar Felix Fabri encountered no monsters, but he described his journey to Jerusalem via Venice in great detail, providing far more than just the standard "out and back" arc of travel to the Holy Land common among earlier travel writers.[17] Fabri's account reads more like a modern travelogue, as he provides colorful commentary on his companions, the churches he visits along the way, and what he sees and does at every site.

Concrete evidence about the practice of medieval travel comes from the wide range of artifacts and material remains made or used by pilgrims, Crusaders, explorers, and other medieval voyagers. Pilgrimages have left behind a particularly rich material legacy, since many churches and monasteries were built or enlarged to accommodate massive crowds of pilgrims.[18] All of these structures required furnishings of many types, including reliquaries to house the remains of saints, as well as sculptures and paintings to enhance the devotional practices and customs of pilgrims and other worshippers.[19] The physical traces of the Crusades are similarly prominent. Crusader castles still mark the landscape in the eastern Mediterranean world, their architecture reflecting lessons their builders learned both from Byzantine fortifications, and from

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16   For editions of Marco Polo's text, see note 3 above. Recent critical studies on Marco Polo include John Larner, *Marco Polo and the Discovery of the World* (New Haven, 1999). Noteworthy recent editions of Mandeville's text include Tamarah Kohanski, *The Book of John Mandeville: An Edition of the Pynson Text with Commentary on the Defective Version* (Tempe, AZ, 2001); while recent interpretive perspectives can be found in Christiane Deluz, *La Livre de Jehan de Mandeville: Une "géographie au XIVe siècle* (Louvain-la-Neuve, 1988); and Iain Macleod Higgins, *Writing East: The "Travels" of Sir John Mandeville* (Philadelphia, 1997).

17   Felix Fabri, "The Wanderings of Felix Fabri," *The Library of the Palestine Pilgrims' Text Society*, trans. Aubrey Stewart (New York, 1971).

18   The literature on the art and architecture of pilgrimage is broad and impossible to synopsize briefly. For a recent historiographical essay on the topic, see Paula Gerson, "Art and Pilgrimage: Mapping the Way," in *A Companion to Medieval Art: Romanesque and Gothic in Northern Europe*, ed. Conrad Rudolph (Malden, MA, 2006), pp. 599–618. See, among many others: Sarah Blick and Rita Tekippe, *Art and Architecture of Late Medieval Pilgrimage in Northern Europe and the British Isles* (Leiden, 2005); Denis Bruna, *Enseignes de pèlerinage et enseignes profanes* (Paris,1996); John Crook, *The Architectural Setting of the Cult of Saints in the Early Christian West, c. 300–1200* (Oxford, 2000).

19   Again, among many others: Ellen Shortell, "Dismembering Saint Quentin: Gothic Architecture and the Display of Relics," *Gesta*, 36/1 (1997), 32–47; Ben Nilson, "The Medieval Experience of the Shrine," in Jennie Stopford (ed.), *Pilgrimage Explored* (Woodbridge, Suffolk, 1999), pp. 95–122; Scott B. Montgomery, "Mitte capud meum ... ad matrem meum ut osculetur eum: The Form and Meaning of the Reliquary Bust of Saint Just," *Gesta*, 36/1 (1997): 48–64.

the experience of combat against Islamic forces.[20] This architecture, in turn, went on to influence the design of later castles built in western Europe. The blending of eastern and western influences also may be seen in other Crusader artifacts, including illuminated manuscripts, paintings, sculpture and goldwork.[21] All journeys, whether by pilgrims, Crusaders, or others, could leave behind material traces that, together with documentary records, give modern scholars valuable insight into the practical realities of medieval travel. The visual arts provide another rich source of information on the topic. Surviving maps, in particular, provide some of the most explicit representations of the medieval world picture, revealing the theoretical preoccupations and priorities of their makers and users in visual form.[22]

The essays in this book offer a series of complementary perspectives on the practice of medieval travel, with particular emphasis on artistic, scientific and technological developments. Instead of providing a map or overview of medieval travel, this volume describes one particular itinerary through this vast territory, with stops along the way at particularly interesting attractions. A central theme throughout these papers is the dialog between theories and practices of travel. The first section of the book examines the practicalities of medieval travel, with particular attention to logistical planning and vehicle use. The second section addresses the relationship of travel to the visual arts, while the third considers the representation of the world in maps. The final section then discusses the navigational instruments whose employment in the later Middle Ages prepared the way for the Age of Exploration. The rise of maps, charts, and other highly theorized modes of representation, in other words, contributed strongly to a revolution in the practice of travel after 1500. Taken together, therefore, the papers in this book describe an arc not only across time but also from practice to theory and back.

In the Middle Ages, as in antiquity, the technological constraints on travel were substantial. Overland transport had to be accomplished by human or animal power,

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20   See, among recent sources, Hugh Kennedy, *Crusader Castles* (Cambridge, 1994). For more general archaeological perspectives, see R. D. Pringle, "The State of Research: The Archaeology of the Crusade Kingdom of Jerusalem: a review of work 1947–1997," *Journal of Military History*, 23/4 (1997): 389–408; and Adrian J. Boas, *Crusader Archaeology: The Material Culture of the Latin East* (London, 1999).

21   For scholarship on Crusader art, see in particular the work of Jaroslav Folda, including his *Art of the Crusaders in the Holy Land, 1098–1187* (Cambridge, 1995) and the more recent *Crusader Art in the Holy Land: From the Third Crusade to the Fall of Acre, 1187–1291* (Cambridge, 2005). Folda also contributed a historiographical essay, "East Meets West: The Art and Architecture of the Crusader States," in *A Companion to Medieval Art: Romanesque and Gothic in Northern Europe*, ed. Conrad Rudolph (Oxford, 2006), pp. 488–509. See also, among others: Daniel Weiss, *Art and Crusade in the Age of Saint Louis* (Cambridge, 1998), and Bianca Kühnel, *Crusader Art of the Twelfth Century : A Geographical, an Historical, or an Art Historical Notion?* (Berlin, 1994).

22   Again, amid a broad literature, a few selections: Evelyn Edson, *Mapping Time and Space: How Medieval Mapmakers Viewed Their World* (London, 1997); Anna-Dorothee von den Brincken, "Mappa mundi und Chronographia," *Deutsches Archiv für Erforschung des Mittelalters*, 24 (1968): 118–86; David Woodward, "Reality, Symbolism, Time, and Space in Medieval World Maps," *Annals of American Geographers*, 75/2 (1985): 510–21.

while at sea wind power provided the only practical adjunct to the power of human rowers. Rates of travel were therefore quite slow by modern standards. Even the legions of the superbly organized Roman army generally moved only about 20 miles per day, and 50 miles was probably the greatest distance they could travel in a 24-hour span, since Julius Caesar cites his army's one forced march of that length as extraordinary.[23] Transport by ship was far more efficient than overland transport, especially where heavy cargoes were involved, but speeds were still far from impressive by modern standards.[24] Even when the Roman imperial transport network was at its height, a sea voyage from one end of the Mediterranean to another would take several weeks, with overland journeys taking still longer.

Long-distance travel generally became more difficult with the breakdown of the Roman empire, at least in western Europe, but the early Middle Ages did witness several consequential innovations in transport technology. Careful breeding programs led to the emergence of horse types suited for specific tasks, from the agricultural to the military. The refinement of the horse collar offered an improved way to literally harness animal power, so that horses came to displace oxen as the principal traction animals for plowing fields. The greater speed of horsecarts over oxcarts, moreover, facilitated intercity commerce, thus contributing indirectly to the growth of urbanism. The invention of the stirrup, similarly, gave horsemen greater control and stability, contributing to the military effectiveness of mounted knights and social pre-eminence of the aristocratic warrior class. In all these cases, though, the changes appear to have been evolutionary rather than revolutionary.[25] At sea, meanwhile, the development of the Viking ship allowed Scandinavian warriors to raid throughout Europe, even into the Mediterranean and Russia, while their brethren launched voyages of exploration that reached across the Atlantic to North America.[26] It was not until the late fifteenth century, though, that sailing ships optimized for ocean travel began to appear, setting the stage for the spread of European power

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23   Julius Caesar, *Gallic Wars*, VII, 41.

24   Peter Brown notes that "it cost less to bring a cargo of grain from one end of the Mediterranean to the other than to carry it another 75 miles inland," in *The World of Late Antiquity* (New York, 1989), p. 13.

25   These points were first brought to prominence by Lynn White, Jr., in *Medieval Technology and Social Change* (Oxford, 1962). Bernard Bachrach challenged White's claims about the stirrup in "Charles Martel, Mounted Shock Combat, the Stirrup, and Feudalism," *Studies in Medieval and Renaissance History*, 7 (1970): 49–75. On the stirrup and harness, see also Kelly DeVries, *Medieval Military Technology* (Peterborough, Ont., 1992), pp. 95–122; and Paul J. Gans, "The Medieval Horse Harness: Revolution or Evolution?" in Marie-Thérèse Zenner (ed.), *Villard's Legacy* (Aldershot, 2004). For more general discussions, see Ann Hyland, *The Horse in the Middle Ages* (Sutton, 1999); and Robert Friedel, *A Culture of Improvement* (Cambridge, MA, 2007), pp. 15–29.

26   For Viking ships and their cousins, see: Anton Wilhelm Brøgger and Haakon Shetelig, *The Viking Ships, Their Ancestry and Evolution*, trans. Katherine John (Oslo, 1951); Peter Foote and David M. Wilson, *The Viking Achievement* (New York, 1970); Richard W. Unger, *The Ship in the Medieval Economy 600–1800* (London, 1980); John R. Hale, "The Viking Longship," *Scientific American*, February 1998: 58–66; and Robert Gardiner and Arne Emil Christensen (eds.), *The Earliest Ships: The Evolution of Boats into Ships* (Annapolis, 1996).

after 1500. In the central Middle Ages, therefore, innovations in the use of vehicles often proved as important as innovations in their design, as the first section of this book suggests.

The first essay on the practice of travel, by Bernard Bachrach, considers the logistical preparations that allowed Charlemagne's armies to outperform rival forces. Based on examination of Charlemagne's surviving edicts and reports detailing their implementation, Bachrach's essay demonstrates that the emperor demanded a high degree of coordination and standardization in the provision and transportation of foodstuffs for his armies. More specifically, he mandated the construction of heavy-duty war carts called *basternae*, all of which would have the same carrying capacity. This uniformity made it easy for his lieutenants and field commanders to know precisely how many supplies they had on hand for a given campaign, giving them a crucial advantage over their less well-organized adversaries. As Bachrach observes, bureaucracy itself deserves to be understood as a technology, one that can greatly increase the effectiveness of vehicles, weapons, and other more tangible tools.

John Dotson engages the question of vehicle design more directly, exploring the complex trade-offs that governed naval architecture in the medieval Mediterranean. In particular, Dotson examines the factors driving the replacement of the bireme galley by the trireme in the decades around 1300, a development that becomes comprehensible only when economic, military, and mechanical considerations are all taken into account. The maneuverability of galleys made them indispensable as warships, even though they were unable on their own to defeat the largest round-bodied sailing ships of the day. But the expense of paying skilled oarsmen made it impractical to support the construction of ships that could not pay for themselves otherwise. Trireme galleys were large enough to carry useful paying cargoes, unlike the earlier biremes. The development of even larger galleys made little sense, though, since mechanical inefficiencies and crew salaries grew faster than the benefits they conferred.

The third essay in this section, by Julian Munby, reinforces the crucial point already made by Bachrach and Dotson: namely, that major changes in the pre-modern practice of travel often depended on how vehicles were used, rather than on revolutionary technical innovations in their design. Munby discusses the transportation revolution of the sixteenth century, which saw the rapid proliferation of coaches in courts and cities of Europe where vehicles had formerly been relatively rare. Adopting a careful archaeological approach, he demonstrates that these coaches differed little, in technical terms, from earlier medieval carriages. The crucial distinction was sociological, since men in the court of Hungarian King Mattias Corvinus managed to establish riding in vehicles as a respectably masculine activity, even though it had formerly been seen as feminine. A linguistic record of this history survives in the term "coach," which derives from Kocs, the name of a small town on the road between Budapest and Vienna.

David Kennett's essay, which rounds out this section on the practice of travel, considers the documentary evidence for the use of barges and carts for transporting brick in late medieval England. After examining the use of terms such as "carriage," "carting," "freight," and "freightage" in the construction accounts for structures such as Caister Castle in Norfolk, Kennett offers the general conclusion that land transport

may have been used for the conveyance of heavy loads more often than has usually been supposed. Kennett's analysis suggests that the practical difficulties in loading and unloading barges, combined with the obstructions on many smaller waterways, largely negated the theoretical advantages of water transport. Late medieval project managers, not surprisingly, appear to have decided upon their transport strategies only after careful consideration of local topography and delivery options.

The second section of this book explores the treatment of travel, and its effect in the visual arts. Here, even more than in the volume as whole, the breadth of the topic defies easy synopsis. Pilgrimage by itself produced an astonishingly rich visual culture of its own, as noted previously, fostering not only the construction of churches and the creation of reliquaries, paintings, and sculptures to flesh out the bones of the saints, but also the manufacture of pilgrims' badges and the illumination of manuscripts, among other artistic creations. Crusade, exploration, and missionary work, similarly, encouraged the production of many genres of travel-related artwork. The three essays in this volume cannot provide a comprehensive overview of this material, but they do demonstrate that architecture, large-scale painting, and manuscript illumination could all prompt their viewers to contemplate the meanings and effects of travel.

Michelle Duran-McLure opens this discussion by considering the relationship between pilgrims and portals in late medieval Siena. As she explains, the city owed its growth in large part to its favorable location on the Via Francigena, the principal pilgrimage route from northern Europe to Rome. The governing council known as the Nine, which came to power in 1287, took a particular interest in promoting what might now be called the city's brand, its image as the earthly city most favored by the Virgin Mary. The Nine therefore oversaw the addition of Marian imagery on the principal gates leading into the city. This program, combined with the largely standardized "look and feel" of the city's brick-based architecture, helped to establish Siena's identity as a particularly noteworthy and memorable stop on pilgrims' itineraries.

The second essay in this section, by Anne McClanan, presents a rather different gloss on Siena's relationship to travel. McClanan examines depictions of multicultural groups brought together by travel. She focuses on two frescoes painted by Ambrogio Lorenzetti, the *Martyrdom of the Franciscans*, originally located in the chapter-house of the Church of San Francesco, and *Good Government in the Countryside*, from the Palazzo Pubblico. The former shows Franciscan missionaries before the Mongol Khan, while the latter shows a group of mixed ethnicity in the environs of Siena itself. As McClanan explains, slaves imported from Asia were a conspicuous minority in Siena, attesting to the city's far-flung mercantile connections. Lorenzetti's frescoes thus seem to celebrate the work of the missionaries and merchants whose careers contributed to Siena's vitality and prominence.

In the final essay in this section, Annette Lermack explores the role of the visual arts in fostering the sort of mental travel that she calls virtual pilgrimage. More specifically, she considers the ways that Bonne of Luxembourg, wife of the future French King John II, could have used her elegantly illustrated psalter as a devotional tool, one that would lead her on a spiritual journey through penance and suffering to piety. The metaphor of life as pilgrimage comes through vividly in the text and

miniature illustrating *The Six Degrees of Charity*, which jointly describe a journey up a stairway of six steps toward the goal of God's perfect love. Lermack's close analyses of the text–image relationships in Bonne's psalter thus add a welcome degree of specificity to the discussion of mental travel, an important but elusive topic that deserves to be considered alongside the more physical modes of travel discussed in this volume.

The third section of this book concerns maps and mapping, a particular kind of highly theorized visual representation of the terrestrial environment. The process of map making draws together the worlds of art, science, technology, and imagination. It is worth emphasizing that maps do not just describe geographical features in a strictly neutral fashion. Map makers draw lines where boundaries are disputed, and make decisions about which places are included and which are not. Since map makers in essence create new worlds every time they set out to describe one, maps inevitably reflect cultural priorities current at the moment of their creation. The history of map making thus offers a fascinating perspective on the changing medieval perceptions of nature and mankind's place within it. The four essays in this section complement each other in terms of both scope and method, moving from the universal and theoretical to the specific and the practical.

Nigel Hiscock opens this discussion with an essay tracing the impact of Christian Platonist thought on medieval maps and church plans, with particular emphasis on the idea that both earth and man are microcosms of the universe. Hiscock traces the Christian reception of these concepts through Augustine and Boethius to later medieval thinkers, including Hildegarde of Bingen and Durandus of Mende. Along the way he discusses the themes of the world and the city, the body and the temple, using a diverse assortment of maps, texts, and church designs to argue his case for the centrality of Platonist thought in medieval conceptions of space and order. Hiscock's essay thus stands, in effect, as a microcosm of the broad topic he engages.

The next essay, by Dan Terkla, adopts a very different approach, zeroing in on the particular case of the Hereford Mappa Mundi, which, like others of its type, shows the full extent of the world known at the time. Drawing on a wide range of previous scholarship, Terkla investigates the processes by which medieval expositors could have explained the map's content to contemporary audiences. Seeking to situate these didactic activities in their spatial context, he argues that the map was originally displayed in the mortuary complex of the Cantilupe family, located in the northern side of Hereford Cathedral. Terkla thus suggests that the medieval engagement with maps could be a complex multimedia experience, one that engaged the viewer on multiple levels of sense and signification.

Turning further toward the specific, Nick Millea discusses the Gough Map, which depicts the British Isles rather than the world as whole. As Millea points out, this remarkable document deserves recognition both as the earliest surviving route map of Britain, and as the earliest surviving topographic map depicting Britain with a recognizable coastline. Compared to the Hereford Mappa Mundi, the Gough Map is less theological and more geographically precise, as Millea demonstrates by discussing the representation of specific settlements, routes, rivers, forests, lakes, and mountains. In addition to describing the map itself, Millea describes recent projects investigating the map's function and provenance. Based on careful computer-

based comparison of the distances in the map with those in the actual landscape, he proposes that the Gough Map may be a copy made in the vicinity of Oxford of a lost prototype created to celebrate Edward I's conquests.

The final essay in this section, by Evelyn Edson, takes as its subject not a particular map, but a particular user of maps, Petrarch. Edson considers the itinerary that Petrarch wrote to guide his friend Giovanni Mandelli to the Holy Land. Petrarch himself did not make the voyage, since he was prone to seasickness, but he was able to provide his friend with a wealth of valuable information by drawing on literary sources and maps of several varieties. Significantly, Petrarch appears to have paid careful attention not only to theologically freighted *mappae mundi*, but also to practical navigational charts of the kind that were coming into use in the fourteenth-century Mediterranean.

By invoking navigational charts, Edson's essay leads naturally to the final section of this book, which deals with navigational instruments and their changing role in the late medieval world. In dealing with the practical technologies of travel, this portion complements the opening section on vehicles and logistics. But, while the developments discussed there were socially or empirically driven, the development of navigational instruments had a stronger theoretical character. The history of navigational instrumentation, in fact, bears witness to a fruitful dialog between the theory and practice of travel. The practice of travel in general, and contact with Islamic civilization in particular, helped to acquaint Europeans with navigational tools such as the compass and the cross-staff that originally had been invented in China. The resulting increase in the theoretical and technical expertise of European navigators, in turn, helped to set the stage for the great voyages of exploration undertaken around 1500, inaugurating a whole new era in the practice of travel, and, more broadly, in the history of world civilization.

The first essay in this section, by Rich Paselk, provides a concise synthetic history of medieval navigational tools. This essay thus functions as a navigational tool in its own right, permitting readers to get a sense of how specific technical developments fit into the larger history of medieval travel and exploration. As Paselk explains, successful navigation involves the determination of both direction and location. Many instruments, such as the quadrant, the cross-staff, and the astrolabe, facilitated observation of the heavens, which could provide both kinds of information. The magnetic compass, meanwhile, could provide a reading of direction regardless of the weather. The use of such tools, together with written records, tables, and maps, helped to liberate navigators from dependence on local expert guides, establishing a fundamentally new paradigm for travel in the age of exploration.

This volume concludes with an essay by Sara Schechner on astrolabes and their use by medieval travelers. Astronomers and astrologers were the principal users of astrolabes, and Schechner concedes that few travelers would have had the skills to operate these instruments, or the wealth to acquire one. It nevertheless seems that a certain elite subset may have used these versatile instruments in their journeys, as she argues after analyzing both astrolabes themselves and the textual and visual records of their use. Since astrolabes included tympan plates that were calibrated for use at specific latitudes, the presence of multiple plates in a given astrolabe suggests its use in different locations. Schechner demonstrates, though, that the widespread

use of astrolabes in navigation began only in the late fifteenth century, as Portuguese voyages down the African coast helped to launch the age of exploration.

Taken together, the essays in this book demonstrate both the significant constraints on medieval travel, and the importance of travel in catalyzing fruitful medieval developments in artistic, scientific, and technical fields. By paying close attention to some of the ways in which medieval innovators reshaped the both the practice and the theory of travel, the authors of these essays help to explain how and why the travel culture of the modern world came to differ so radically from that of Antiquity. Along the way, they illuminate many diverse chapters in medieval history, showing how artists and emperors, craftsmen and navigators all contributed to the technical culture of travel. A single volume cannot provide a comprehensive treatment of this vast topic, yet the essays collected here together provide a thought-provoking tour through the territory.