



MAPS

FINDING OUR PLACE IN THE WORLD

Edited by James R. Akerman and Robert W. Karrow Jr.

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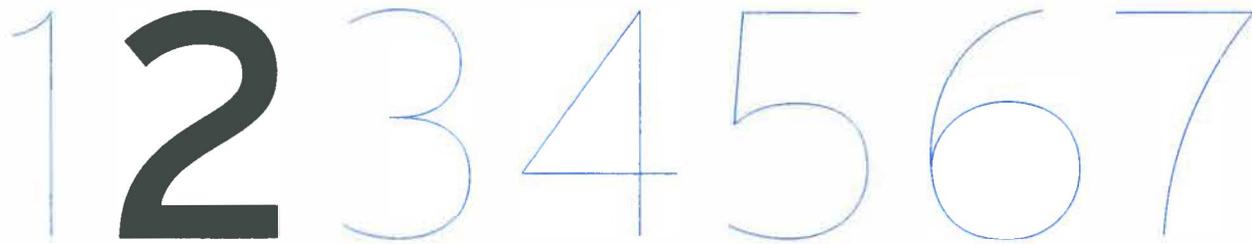
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MAPPING THE WORLD

Denis Cosgrove

For most modern people, a world map of continents and oceans, with physical features or political divisions colored and labeled, is so familiar as to pass unremarked.¹ We may have noticed the Mercator projection's (fig. 30) enlargement of Greenland at the expense of Australia, or have been struck by the unfamiliarity of Arno Peters's equal-area world map (fig. 31) that claims to give the poorer parts of the world due prominence by hanging the continents like a line of overstretched laundry (King 1990; Monmonier 2005). But for the most part we take for granted the authority of a modern world map as a scientific document.

With a moment's reflection, however, "the world map" becomes a more complex affair. We might consider the meaning of *world*. It is different from *Earth* or *globe*. For an Abbasid imam in ninth-century Baghdad, a Mandarin administrator in Ming China, a precontact Kwakiutl chief² on Vancouver Island, or the Genoese navigator Christopher Columbus, the world did not encompass the globe, and *Earth* denoted an element rather than the planet. We might reflect too that the familiar global patterns of land and sea have come into certain focus only very recently. When I open my university atlas from

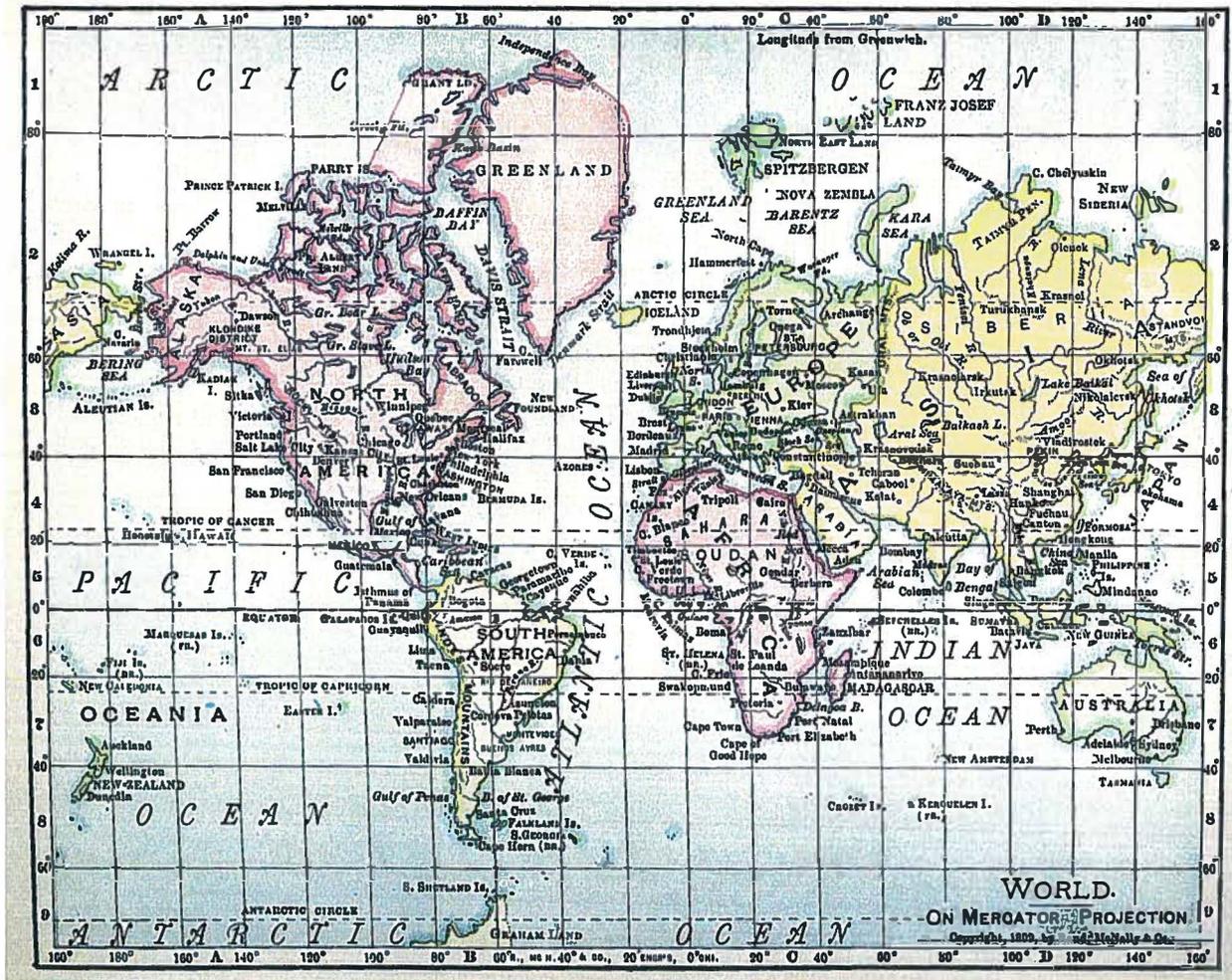
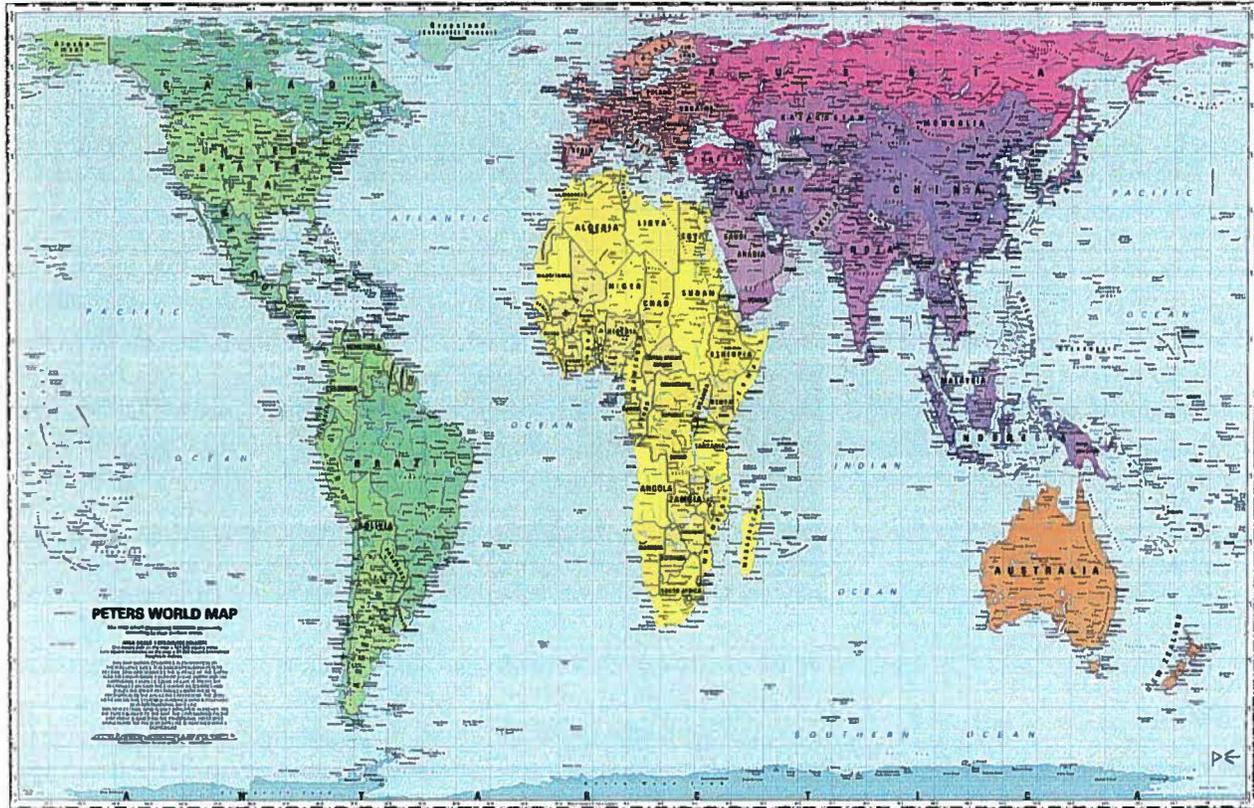


FIGURE 30.
 "World on Mercator Projection." From *The Vermont Phoenix Dollar Atlas of the World* (1900).

the 1960s to the southern polar region, I find question marks rowed along the edges of the Antarctic Continent. They indicate uncertainty about the precise line of its ice-obscured coasts.

This chapter explores such aspects of the world map, discussing first world mapping in times and cultures very different from our own, and then examining the cartographic processes by which *world* became synonymous with the planetary globe, and resolved itself into the familiar patterns of today's map or satellite image. The task is of more than antiquarian interest: one of the principal arguments here is that for all their unquestioned scientific accuracy, empirical authority, and technical sophistication, contemporary world maps remain cultural artifacts, sharing—perhaps unexpectedly—many attributes of the world maps of nonmodern cultures (see Cosgrove 1999b; Edney 2005; Jacob 1996).



THE PETERS WORLD MAP

Five thousand years of human history have brought us to the threshold of a new age. It is an age of science and technology, and an age of growing internationalization of all nations and peoples.

Such a moment in history demands that we look critically at our conceptions of the world. This understanding is based, to a significant degree, on the work of map-makers of the ages before Europe discovered and explored the world. But these maps, even more so than their predecessors, are not really true to their own age.

This new map, the work of the German cartographer Arno Peters, provides a helpful corrective in the day of discovery of these maps. While the Peters Map is superior to the maps of the past, it is not perfect. Its importance goes far beyond questions of cartographic accuracy. Feeling has been our world-view of our world.

MAP PROJECTION: Drawing the round globe of the earth onto a flat surface is a very tricky task. The Peters Projection belongs to the category of maps that retain true proportions of land masses. Each country's size (as well as the areas covered by water) can be directly compared.

All north-south and east-west lines on the Peters Map run at right angles thus preserving a characteristic that is present on the globe itself.

Other map projections emphasize different qualities. For example, Mercator's projection facilitates the use of a compass bearing for navigation.

The Peters sets forth all countries in their true size. Dr. Peters assumed that his projection thus treated all people fairly.

In this complex and bewildering world in which the nations race for the parcels of the world, deserve the most accurate possible portrayal of the actual sizes of their countries. The Peters map achieves that goal.

WHO IS PETERS MAP MAKING AREA

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WORLD, EARTH, AND GLOBE

“World” is a social concept. When we claim that an autistic child “lives in her own world,” we are referring to her social and communication skills as much as to her relations with her material environment. *World* is a flexible term, stretching from physical environment to the worlds of ideas, of microbes, of sin. Arguably, all these worlds can be mapped in the sense of being presented graphically according to spatial criteria, and indeed imaginative and affective relations play a significant role in world maps. But my discussion here will be restricted to human worlds that are conceived and experienced with at least some direct reference to material space. Their scale, however, may range from that of the individual body to the planetary earth. In contrast with *world*, *Earth* refers today to the planet that sustains life; its reference is elemental rather than

FIGURE 31
 Arno Peters, “Peters World Map” (2004). © 2005,
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FIGURE 32.
View of the Earth seen by the Apollo 17 crew
traveling toward the moon (December 7, 1972).



social. The 1972 photograph taken by NASA's Apollo 17 astronauts, unique as an eye-witness photograph of humans' home planet (fig. 32), is referred to as the "Whole Earth" (although it actually shows only one hemisphere) rather than as an image of the world (Cosgrove 2001, 257–67). It is certainly not thought of as a "map," although it shares many technical aspects with world maps, and has influenced considerably the design of subsequent world maps—for example the disappearance of the graticule (grid) of latitude and longitude, the "photographic" appearance, and the use of "natural" color on many wall and atlas maps today. Nor do we think of the space it represents as "the world," in part because it does not show the whole surface of the earth, but more because it lacks visible reference to human presence. We expect a world map to present a synoptic, or all-encompassing, view with evidence of human existence, although we recognize the physical impossibility of such a unitary vision across a three-dimensional sphere.

Globe is a geometric term, another word for a sphere. Cartographically, *globe* is reserved for three-dimensional, solid models of the Earth (or other planets).³ The relationship between the globe and the modern world map is close. Some world maps seek to maintain the visual trace of the globe by framing the world in paired hemispheres (figs. 51, 54, and 55) rather than projecting a rectangular "planisphere." Hemispheric arrangement allows, as we shall see, a wealth of other information about "the world" to be incorporated within the frame of the image, connected to, but distinct from, the mapped space proper.

The modern, scientific conception of the world extends to the whole of the globe and encompasses the whole earth, which is why these three terms

are now interchangeable. Any world is a totality and has spatial boundaries, but the coincidence of the world's boundaries with the planetary globe's is a modern conception, a consequence as much as a cause of maps. Every culture creates a "world" in which it is "at home" and beyond which other spaces seem alien, exotic, often threatening. A world map pictures the totality of the lived space of a culture. There is an urge toward comprehensiveness and synopsis in all world maps, using spatial graphics to illustrate connections among the many and diverse elements that constitute worlds of experience. Locating and delimiting are key aspects of imagining the totality of a world. Marking its center and edges are structuring features of all world maps, thereby "normalizing" the center and "othering" the edges.⁴ World maps are inescapably ethnocentric to some degree, and this remains true of modern maps, although the globe itself possesses neither center nor borders. A two-dimensional world map has both. From a religious perspective, the limits of terrestrial space can correspond to those of secular time, giving some world maps a spiritual dimension that reinforces their totalizing and synoptic aspects, often rendering them objects of moral reflection if not veneration.

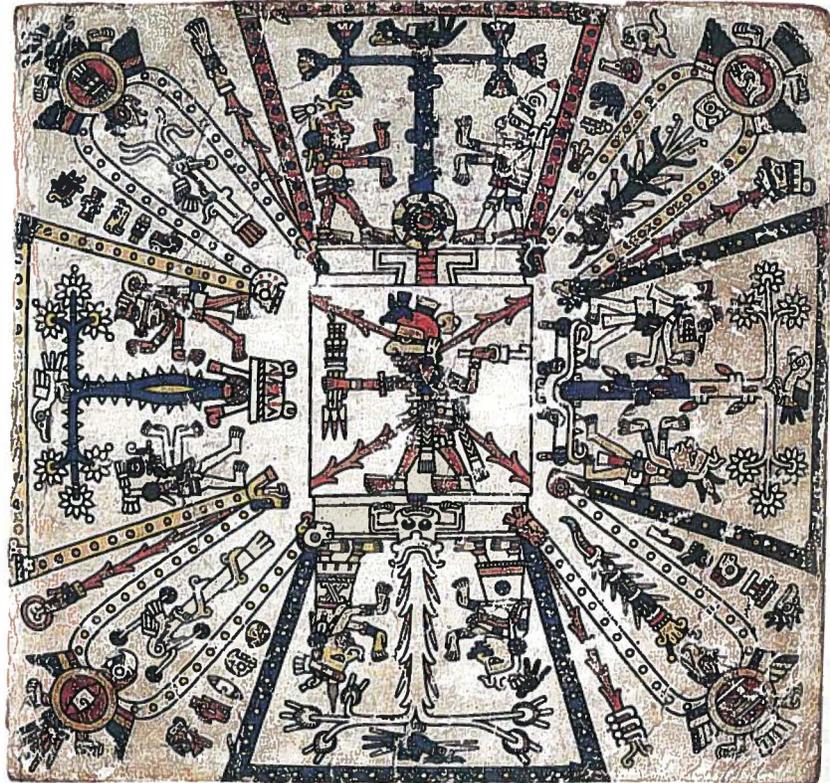
The best way to understand these aspects of world maps is through specific examples of how different cultures have mapped their world, noting recurrent features, before turning to modern world maps and the ways they resemble and differ from nonmodern images.⁵ My choices cannot hope to be comprehensive or even representative of the vast number of maps seeking to illustrate "the world," and my ordering reflects no systematic scientific, cultural, or aesthetic criteria. In attaching documents to place, every selection is a kind of mapping exercise, but I have sought to avoid privileging any one tradition of cosmographic⁶ and world mapping over another.

NONMODERN MAPPED WORLDS

Mesoamerica

The Codex Fejérváry-Mayer is a manuscript that dates from the fifteenth or early sixteenth century, before the arrival of Spanish *conquistadores* in Central America in 1521. Its frontispiece is a complex illustration of figures and symbols (fig. 33). Aztec records of pre-Columbian Mesoamerican belief and cultural practices allow us to make sense of this compelling image as a map of the world (Léon-Portilla 1991, 540–41). Its formal structure is that of a Maltese cross whose inner square contains a figure in profile: Xiuhtechitli, god of the hearth and fire. The radial format extending from Xiuhtechitli should be read perspectively. The image represents three-dimensional space and cosmic time: the picture is thus at once map and calendar. At the corners are the head, bones, foot, and arm of the cosmic creator, Tezcatlipoca, lord of everywhere, whose lifeblood we see flowing inward toward Xiuhtechitli. Symbols of sacrifice and worship—the

FIGURE 33.
Frontispiece, Codex Fejérváry-Mayer (1400–1521).



temple platform and altar, the disk of the sun, and a bowl of incense—surround the inner square at the junction of cosmic and domestic space. The world's surface extends toward the cardinal directions: East (red, at the top), West (blue, below), North (yellow, left), and South (green, right). The Mesoamerican world rested upon primordial waters, while the sky above and the sun's diurnal path were supported by a world tree extending to the four corners, and here represented by the T shapes at each cardinal direction. These "trees" refer to plants central to Mesoamerican life: clockwise from the South are the cacao, the maize plant, and a cactus, reflecting also "the biogeography of central Mexico: fertile croplands to the west, deserts to the north, and tropical lowlands to the south-east" (Mundy 1998, 232). East is the most sacred direction, whence the sun rises from the turquoise tree. It will set in the West (here gendered as female space by the clothing of figures there), where the crouching *tzitzitl* demon of the dusk awaits unwary souls. The dots marked along the framing lines indicate the 260-day calendar of 20 named days, counted thirteen times. The image illustrates a complex set of associations between forms, colors, and concepts in which "space—in the form of community territory—also dovetails with time, manifest as episodes of human history" (ibid.).

As a world map, the Codex Fejérváry-Mayer can only be understood in relation to the worldview or cosmology and practices of pre-Columbian Mesoamer-

icans. It displays a number of structural and formal elements that recur in the world maps of other nonmodern cultures, despite marked differences in geographic location, cosmology, and graphic conventions, but bears no apparent relation to the modern world map. The world's vertical dimension—extending up toward the skies or heavens and down to a primordial underworld—is as significant as its surface and thus is mapped into the image. The center of the map is “home,” the familiar space of everyday life, while the world's boundaries are the edges of known space; they do not encompass the globe. The Codex Fejérváry-Mayer map does not speculate as to what lies beyond the ends of the known space, but its makers' “home” lies at the map's center. Most nonmodern world maps thus normalize the center, banishing the strange and abnormal to the edges. Folding space into time, map into calendar, is also common in nonmodern maps—although we should remember that modern world maps too mark “universal time” in the international date line passing through the Pacific; longitude intervals to indicate diurnal hours; and the passage of the sun between the tropics to measure the year. Use of the square and/or circle to structure the map's formal design and the practice of fitting the form of the human body as a microcosm within the geometry of the macrocosm are also common.

Mapping “the world” presupposes a certain unity and coherence—even beauty—in the cosmos. Indeed, that Greek word itself implies both harmony and visible beauty (the root of the modern word *cosmetic*), marked in the heavens by the regularities of the celestial bodies and on earth in the symmetries of the ideal human body. The two scales are therefore reflected in the form, composition, structure, and decorative elements of world maps themselves, and often in their location and use. More mundanely, the Codex Fejérváry-Mayer, like many world maps, seeks to connect its abstract geometry and ethnography to the specific geographic environment (mountains, rivers, flora, fauna)—and to the customs and culture of the world it represents.

The Fejérváry-Mayer image has the quality of a sacred object that demands reverence in itself and its use. The codex was probably intended for merchants or their advisors, to determine the most auspicious days for undertaking trade or journeys. Less sophisticated and highly wrought versions of the Mesoamerican world it pictures were carved onto public monuments. The codex is now carefully preserved in a modern library, but many, perhaps most, of the world maps made by nonmodern, and certainly by nonliterate, cultures were never intended to be permanent. Nonliterate peoples across the world, including Australia and the Americas, have “performed” their spatial understanding of the forms, structures, and origins of the world in poetry, song, dance, and sacred ritual. Such performances are considered world maps insofar as they describe and illustrate a culture's singular conception of material and spiritual space. They serve similar functions to those played by the world map in modern societies: informing and educating society's members about the world in

Permanent artworks among nonliterate peoples frequently include petroglyphs and cave paintings. Not uncommonly, these include cosmographic images. On the Bandiagara escarpment in modern-day Mali are found some of the earliest African map images, and these too share characteristics found in the Mesoamerican and Navajo examples. A sign known as *adumo kine* (life of the world) is composed of a simple cross, topped by an egg-shaped circle with a symmetrical but open curve below (fig. 34). This anthropomorphic sign has been interpreted as a skeletal map of the cosmos of the Dogon, an agricultural people of the Niger valley. In it, "the egg-shaped head signifies the celestial placenta, while the legs refer to the terrestrial placenta." The torso and arms

Africa

Native peoples of the American Southwest have long incorporated sand (or ground) painting into their rituals. Those produced by the Navajo illustrate a world composed of Earth (human) people, and Holy (supernatural) people, both of whom are obliged to adhere to the rules of the continued proper functioning of the universe. If disaster occurs, ritual performance by the Earth people enlists the Holy people's help in restoring cosmic order and balance. Many disasters are environmental, for example drought or flood, whose origin lies in the heavens. The performance is led by a medicine man, who chants as he sprinkles intricate patterns across a bed of sand using variously colored substances such as dried and pulverized leaves, flowers, bone, or rock. The patterns commonly include recognizable cartographic elements, especially star patterns in the realm of the Holy people, as well as representations of familiar landscape features and sacred landforms. The Navajo world picture associates each of the cardinal directions with a mountain, a time of day, a stone or shell, and a color (G. M. Lewis 1998, 110). East, for example, is represented by Blanca Peak, associated with dawn and represented by a white shell and the color white; while North is signified by Hesperus Peak, associated with night and faith and represented by jet stone and the color black. (The top of the painting normally signifies North or East.) (Lane 2002, 74-78) Sand paintings are erased after the performance, so that we cannot know today their precise nature in the years before native peoples' contact with Spanish or Anglo colonizers, or to what extent postcontact maps are hybrid creations responding to such outside influences. But early twentieth-century images transferred from the ground to woven rugs preserve some record of these precontact peoples' world maps.

The American Southwest

which they live. Their functions may include the moral dimension of teaching proper behavior in the world, just as the Whole Earth image is promoted today as an icon for ecologically responsible conduct.

form a cross representing the cardinal directions” (Bassett 1998, 26). The same form is reproduced in the ground plans of individual Dogon houses and whole settlements, another example of how world mapping often seeks to unite cosmos and hearth (see also Atkin and Rykwert 2005; Tuan 1994). In purely formal terms, this ancient African figure resembles cosmic signs in other cultures, for example the zodiacal sign for Mercury, and the Elizabethan mapmaker John Dee’s *Hieroglyphic Monad*, which was intended to express graphically the totality of the created world (Dee 1947). This is not to suggest either exoteric or esoteric connections between the various images (although occult powers have not uncommonly been attributed to cosmic images; see Jung 1964); rather, anthropomorphism and the geometry of line, circle, and square appear to be graphic devices that readily occur to humans in expressing spatial form and regularity.

Buddhist Asia

World maps of literate peoples, especially those whose cosmologies are scripturally based, can be interpreted much more precisely and confidently than those of nonliterate peoples. Like the Codex Fejérváry-Mayer, they are often objects intended for detailed study and interpretation. Buddhism and Hinduism present some of the most sophisticated of such world maps, again combining geometrically conceived cosmic space with pictorial or symbolic markers of location and topography, and featuring representations of the human body. Buddhism, Indian in origin but spread through China, Japan, and the Indo-Chinese peninsula, has a detailed understanding of the cosmos and the terrestrial world, which has influenced world mapping across Asia. Fundamental is the belief that the universe we know is but one among literally millions of others through which souls migrate. Each world is vertically organized atop the foundational mountain: Mount Meru (Sumeru in China, Korea, and Japan), which probably refers to peaks in the Himalayan Pamirs. Meru is encircled by mountain ranges, continents, and oceans. Vertically, the world divides into the ascending realms of desire, form, and nonform. All life experiences cycles of death and rebirth, and at each incarnation is placed on a plane determined by moral conduct in previous lives. The ultimate goal is nonform, the state of *nirvana*. The terrestrial plane (*K’amadahatu*), insignificant within the vast cosmos, is itself composed of four huge continents and oceans arranged symmetrically at the cardinal directions around Mount Meru, each under the authority of a specific denizen. Of these continents, Jambudvipa is southernmost and the only one inhabited.

Such a vast and complex spatial conception has yielded a considerable range of cartographic representations, many intended as aids to devotion or meditation. In Tibetan Buddhism, for example, mandalas assist the spiritual journey toward self-recognition as an incarnation of the Buddha. Like Navajo

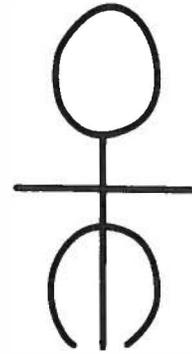


FIGURE 34.
Dogon *aduno kine*, or cosmographic map of the “life of the world.” After Griaule 1949, 81.

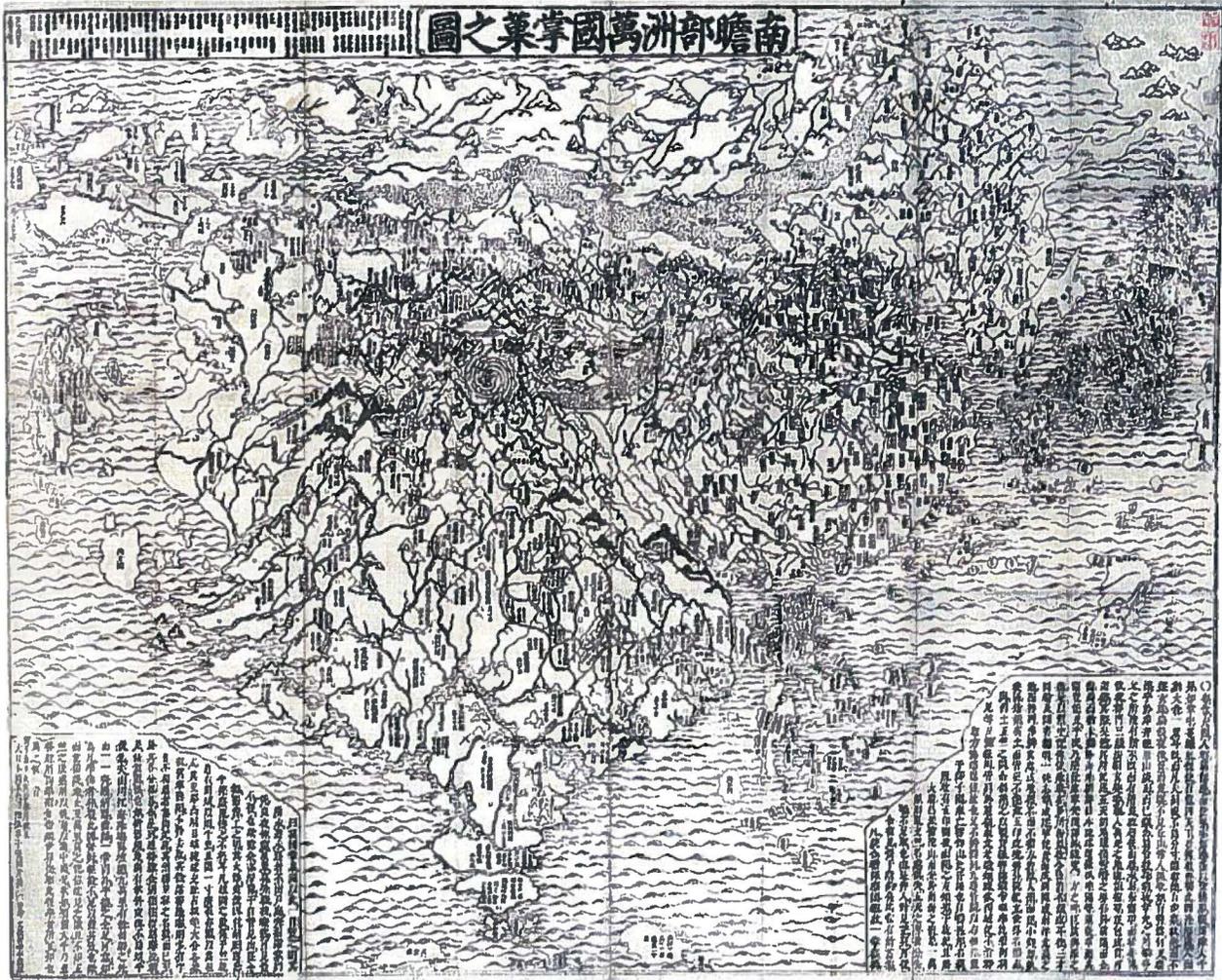
world maps, these are commonly designed as temporary forms using powdered sand, to be swept away after ceremonial use, indicating the transitory nature of all existence (Schwartzberg 1994a, 620). Complex arrangements of circles within squares within circles, colored to represent the four elements, stretch outward from earth (dark blue), through water (light blue) and fire (red) to air (yellow). Colored figures represent places, suggesting the interconnectedness of all things and a universe within which every form is subsumed into another, until only a psychic center remains.

While the mandala typically represents the whole cosmos, individual images can focus on the terrestrial plane alone, more closely resembling what a secular observer might normally think of as a world map. On the terrestrial plane, Mount Meru stands central to a flat, circular earth around which revolve the sun and moon. At its foot are seven mountains and water basins, arranged concentrically, with a brackish ocean beyond and four continents located at the cardinal direction points, each having its distinctive shape. The inhabited Jambudvīpa lies to the south; its characteristic wedge (or inverted-egg) shape is fairly certainly based on concrete knowledge of the outline of the Indian Subcontinent.⁷

Buddhist maps share with the others that we have considered the formal characteristics of a vertical cosmos, geometric symmetry, and color codes. There is some reference to local geography, but the absence of anthropocentricity is distinctive: the inhabited world has no claims to significance or centrality in the spatial organization of creation.

Jambudvīpa appears alone in some Buddhist maps, many produced far from India in China, Korea, and Japan. In being confined to the secular spaces of the earth's surface, such works seem closer to what we conventionally think of as a world map, although comparison is problematic, given Buddhism's unique cosmology. Nonetheless, as with the Navajo maps, the influence of external geographic knowledge is often apparent in these images. Information introduced by traders and colonizers has been incorporated without apparent upset to the conventional world picture. Thus, a 1710 map of Jambudvīpa retains the continental outline and locates traditional places in Buddhist geography while incorporating European geographic knowledge, and indeed the map form of Europe itself in the upper left (fig. 35).

Buddhism's cultural influence spread through China, Korea, and Japan, although only in Japan did Buddhist cartography have lasting and documented influence. Despite scientific knowledge of the relations between solar movements that would have allowed them to do so, before 1600 Chinese scholars did not project celestial coordinates onto the earth to produce a "world" map. The influential Chinese concept of *tianxia* (*chonha* in Korean), translated as "all under heaven," and the idea of China as a "middle kingdom" are taxonomic and ethnological rather than spatial in their reference. Cordell Yee (1994c, 174) points out that the Chinese phrase "all under heaven" implies "a notion of geo-



graphical centrality, but perhaps more important, a belief that China was the center of culture, the standard for civilization”—an ethnocentrism shared with other world mappings that we have encountered. Chinese thinkers certainly saw themselves as living at the center of a world that stretched beyond their realm, whose center was placed at the great sundial of Dengfeng in Manchuria, but historically saw no purpose in mapping the world beyond the empire. The only “world maps” in China prior to the seventeenth-century Qing imperial expansion would have been Buddhist maps of Jambudvipa, which locate the Chinese empire at the continent’s northern margins (see the illustrations in Yee 1994c; also Henderson 1994). The earliest Korean world map dates from the opening years of the Chosun dynasty and the introduction of Confucianism in the late fourteenth century, but as in China proper, Buddhism was persecuted and its cartographic influence consequently difficult to trace. In Japan, how-

FIGURE 35. Soshun (Hotan), “Nansenbushu bankoku shoka no zu” (Visualized Map of All the Countries in Jambudvipa) (1710).



FIGURE 36.
Jukai, "Gotenjiku Zu" [Map of the Five Indies]
(1364).

ever, where Buddhism dates back to the seventh century, it was tolerated. The oldest Japanese maps, "Gotenjiku Zu" (Map of the Five Indies), from the late fourteenth century and probably derived from unknown Chinese prototypes, show the five regions of Jambudvipa within an egg shape, giving China prominence while reducing the size of Korea and plotting the Japanese islands on the eastern edge of the world continent (fig. 36).

Hindu and Jain India

The second great Asian tradition of world mapping relates to Hinduism and the distinct but related Jain belief. Each of the Indian faith traditions, including Buddhism, has gathered cosmological elements from the others. All posit the world as a flat disk suspended between two great bowls turned inward to form the Brahmada, or cosmic egg. Hindu world maps share with Buddhist renderings the idea of four continents arranged in a lotus pattern around Mount Meru, and often include four rivers flowing out from this *axis mundi* (world axis). Surrounding Mount Meru in Hindu and Jain world maps, the seven continents and seas are arranged concentrically, with Jambudvīpa placed at the center. A mathematical ratio of increasing size is established for succeeding continents, seas, and rivers. The continents are under the tutelage of Hindu divinities, and the seas are named for foodstuffs significant in the ecology and dietary practices of the subcontinent (salt, sugarcane, curd, milk, clarified butter, wine, water).

The most intense cartographic expressions of India's syncretic world picture come from Jainism, a minority faith centered in Rajasthan and Gujarat.

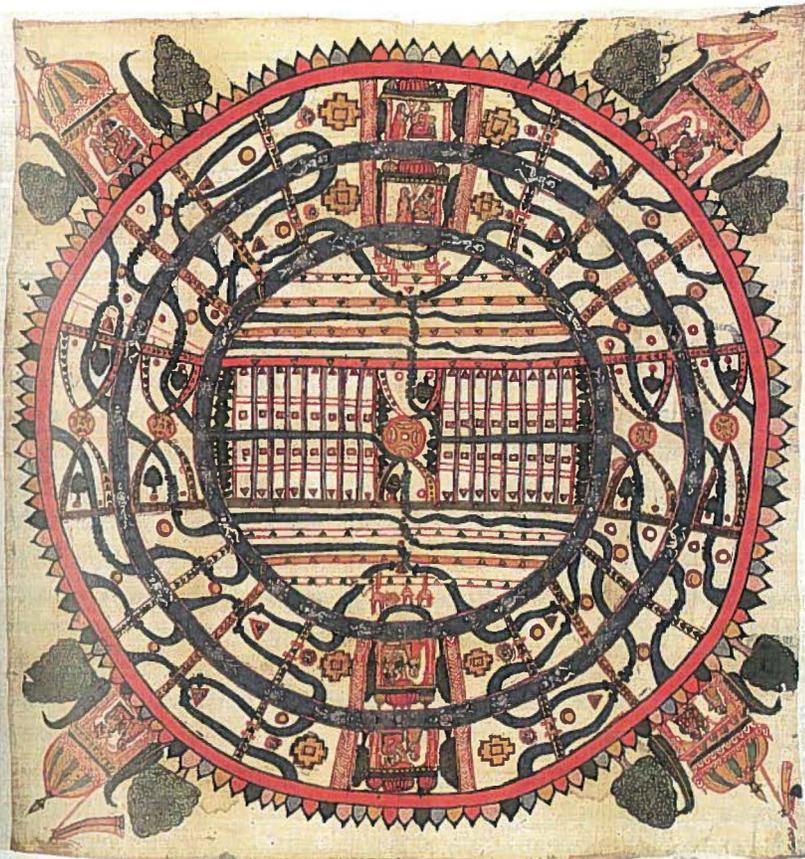


FIGURE 37.
Manusyaloka (Map of the World of Men)
(19th century).

Stone-carved cosmographies here date back to the early thirteenth century, and while their overall form remains constant over many centuries, a bewildering variety of representational symbols appears in the maps. A nineteenth-century Jain work now in Washington, DC, maps *Manusyaloka*, or world of humans, in characteristically intense color, with the circular *Jambudvipa* at the center surrounded by the first (salt) sea ring and a further two continents that lie within the encircling mountain range, limiting the human world (fig. 37). At the corners are four individuals who have achieved liberation from the material world (*moksa*). Mount Meru lies at the very center; the converging elephant tusks represent other mountains, with chains of lakes, rivers, and other topographic symbols emphasized in brilliant color. *Bharata* (India) is probably the crescent shape in the very lowest part of the central continent, located between the rivers Ganga and Yamuna. It is crossed by a mountain chain with the Aryan land at its center. The text notes that *Bharata*'s area is only one-ninetieth the area of *Jambudvipa*. But geographic fidelity is subordinate in the Jain map to a relentless symmetry that reflects its role as a contemplative icon rather than an informational document.

Medieval Western Europe

Geometric symmetry, cardinal orientation, symbolic coloration, and locally focused geographic references are also apparent in medieval European world maps, known as *mappae mundi*. Dismissed in the past as products of inadequate geographic science, to be superseded by the modern world map, these images make sense, like the Mesoamerican, Buddhist, and Jain examples, as spatial illustrations of a scriptural cosmology. Their appearance in prayer books, scholastic manuscripts, and cathedrals indicates their primary didactic and iconic functions. They represent the geographic world as the temporal part of a vertically ordered creation, whose history is revealed in scripture. The geographic content of *mappae mundi* is recognizable through names such as Europe, Asia, Africa, Rome, and Jerusalem. Their contents and evolution reflect medieval Christianity's characteristics as a hierarchical, proselytizing faith for which cultural accumulation and information about the material world reflected a universal mission. The legacy of classical geographic knowledge exists within the *mappae mundi*, but we should resist the temptation to focus on their geographic accuracy to the exclusion of the exegetical purpose of the total image. (On medieval European geographic knowledge, see Lozovsky 2000 and Wright 1925.)

Unlike Indian and Mesoamerican cosmologies, Christianity is monotheistic, with a singular creation narrative and a universalistic redemption story rooted in the idea of the creator God incarnated within historical time. Christianity anticipates a fixed end to historical time and the destruction of the earth. It is strongly anthropocentric, global, and normative in its ideal of universal

salvation. The now destroyed Ebsdorf map, the Psalter map, and the Hereford Cathedral map all reflect these principles explicitly by enclosing creation within the body of God the Father. The earthly globe as the space of salvation is often shown as an orb, the T-O (*terrarum orbis*), held in the right hand of Christ, the Son of Man. Jerusalem, the *axis mundi* of the Christian narrative and the terrestrial junction with upper and lower worlds, lies at its center. Old Testament geographic features such as the Red Sea and Sinai, the terrestrial paradise of Eden, and Mount Ararat are marked, while the three continents are allocated, as the book of Genesis suggests, to the patriarch Noah's sons (Scafi 2006).

Christianity owes as much to Greek philosophy as it does to Hebraic scripture; its cosmography is based as much on Aristotle as on the Bible. The tricontinental world island of the medieval *mappae mundi* reflects the continued influence of an ancient Greek world picture, which locates the elemental world at the center of the cosmos. Its spheres of earth, water, air, and fire are subject to change and imperfection, while movement is characterized as linear, as objects seek their rightful place in the appropriate elemental sphere (falling to earth, for example). Beyond the zone of fire is a celestial world of seven planetary bodies, from the Moon to Saturn, whose motion is circular; beyond these are the fixed stars, the sphere of the prime mover, and the supercelestial realm of the divine. Perfect and unchanging, the celestial world is filled with the fifth element of ether.

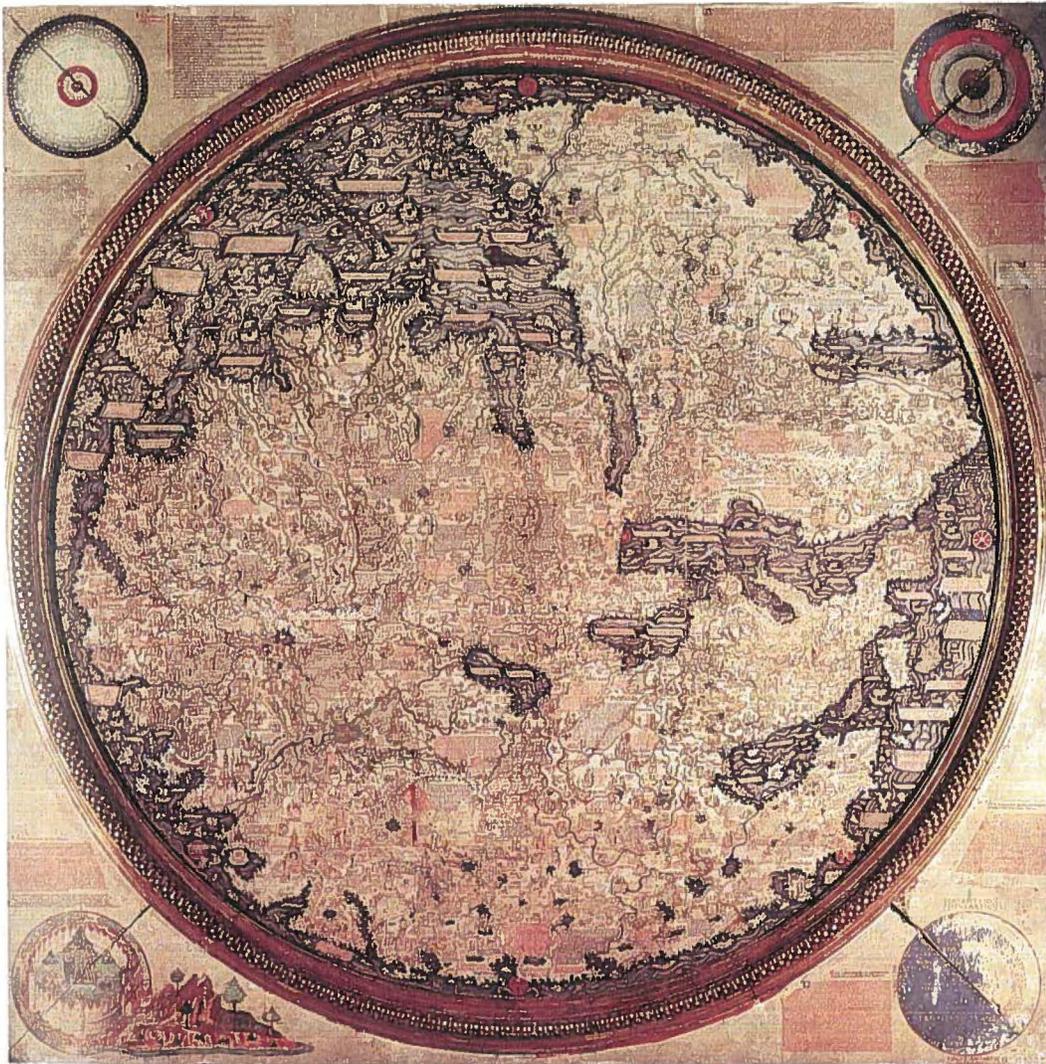
Theoretically, earth should not protrude through the sphere of water, but the elemental world is imperfect, and eccentricity of the elemental spheres explains the world island, surrounded by ocean and penetrated by the Mediterranean, the Nile and the Don, which separate its three continents. This landmass may or may not be balanced by a southern continent. Focused on the Mediterranean, the *mappa mundi* is "center enhancing," portraying an increasingly abnormal and bizarre world toward its edges. When shown, the unknown southern continent particularly was the location for the monstrous, the strange, and the wondrous. The "monstrous races," inherited from Pliny and other ancient writers, appear to the right of the thirteenth-century Psalter map. On the widely copied map by Beatus of Liebana (fig. 38) illustrating his eighth-century *Commentary on the Apocalypse*, this fourth section of the world (at far right) is separated from the rest of the world by a "Red Sea." An inscription explains that the sea is occupied by "fabulous beings," which other versions of the map depict as dog-headed, one-eyed, multilimbed, or otherwise half-human creatures (Friedman 2000). The Beatus map is oval, but maintains the normally circular *mappae mundi*'s emphasis on symmetry by, for example, distributing diagrammatic islands neatly around its edges. Christ's Second Coming, the subject of Beatus's text, is imagined as a universal event entailing the end of space and time. Correspondingly, wind heads signifying the cardinal points of the compass sometimes double on *mappae mundi* as trumpeting angels sounding the final day.



FIGURE 38.
Beatus of Liebana, world map (ca. 1050–60).

PTOLEMY, ISLAM, AND THE WORLD MAP

The mappae mundi owe much to contact and cultural interchange with Islam, initially in Spain and later in the Levant during the crusading years between 1100 CE and 1300 CE. Their geographic information increased as the reports of pilgrims and travelers were incorporated. The last great medieval world maps, produced in mid-fifteenth-century Venice, altered the balance of the sacred and secular elements (Scafi 2006, 235–40). On Fra Mauro's rendering from 1459, Jerusalem is no longer central, and the terrestrial paradise is pictured outside the map area altogether (fig. 39). The friar made explicit use of navigational charts received from King Alfonso V of Portugal, who had commissioned the map. These portolan charts, derived from coastal plotting with compass, rule, and freehand drawing, represent a distinct form of mapping that had been developed for Mediterranean navigation, but extended to the Atlantic and eventually the continental coasts across the globe. Thus the Catalan world map of 1375 represents the coasts from the Black Sea to the Atlantic coast of Africa, charted with astonishing accuracy (fig. 40). It also borrows eclectically on Islamic knowledge, mappae mundi, travel literature, and legend to create



an altogether unique and somewhat bizarre picture of the world. Nonetheless, it is an image that in its secularism and emphasis on earthly power (denoted through flags and enthroned rulers) anticipates an emerging purpose for the world map.

Fra Mauro's text refers to another mode of mapping, based on astronomically determined locations coordinated by a graticule (grid) of longitudinal meridians and latitudinal parallels. Geometry thus allows the sphere to be projected onto a two-dimensional surface, an idea that had been formalized at Alexandria in the second century of the common era by Claudius Ptolemy. This cartographic method was the subject of fevered interest in Fra Mauro's Italy, although the friar himself declared it unsuitable for a modern world map

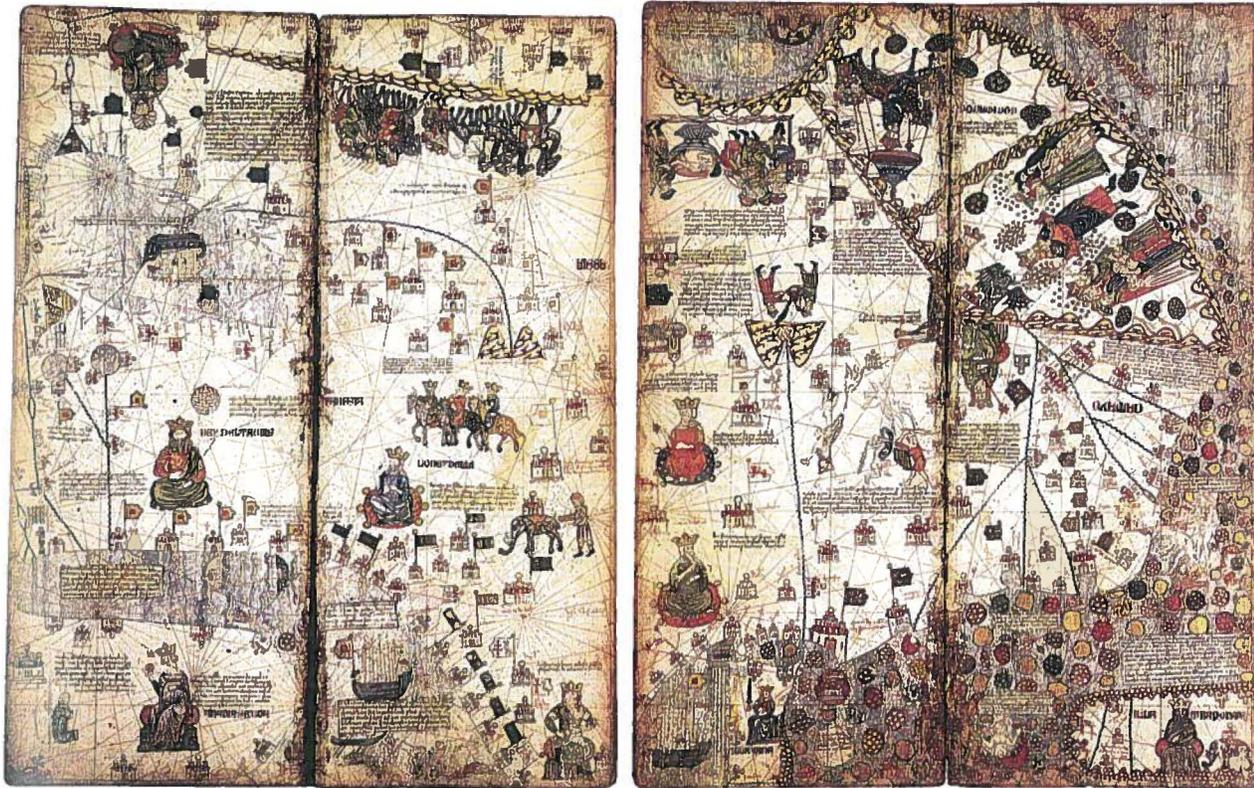
FIGURE 39.
Fra Mauro, "Mappamondo" (World Map) (1459).



FIGURE 40.
 (above; facing) Catalan atlas, attributed to
 Abraham Cresques (1375).

because its framework is restricted to the ancient world. His own rendering, drawing on Portuguese charting of Africa and Marco Polo's reports of Asia, shows a much vaster world of which Europe, although accurately shown, is but a tiny part. Ptolemy's cartographic methods would become fundamental to the modern world map, but not as the simple outcome of their reappearance in fifteenth-century western Europe. His work hybridized in some measure with every one of Eurasia's major cartographic traditions, as it did with the portolan charts and the mappae mundi. This was principally achieved through its dominance of mapmaking in the Islamic world that stretched from its center at the crossroads of the Old World westward to the shores of the Atlantic and eastward to the Indian Ocean and the Pacific.

Claudius Ptolemy lived between 90 CE and 168 CE. His works summarize and synthesize Hellenistic astronomical, astrological, and geographical science. *The Geography* incorporates the extensive geographic knowledge of Greek and Roman empires recorded by such writers as Herodotus and Strabo, and gathered for example by Cornelius Agrippa, whose universal survey sent Joseph and Mary to Bethlehem and yielded a public world map in ancient Rome. Drawing on Greek natural science, Ptolemy could unite conceptually "world" and "globe" in a cartography that corresponded to the Roman claim of *imperium*



ad termini orbis terrarum (empire to the ends of the earthly sphere). He evaluated previous measurements of earth, suggested three methods for projecting the sphere onto the plane using longitude and latitude, and listed over eight thousand coordinates of known places across the inhabited earth—what the Greeks called the *oikoumene* (fig. 41). Larger-scale regional maps were systematically related to the world map. No maps drawn from Ptolemy’s coordinate tables survive from antiquity, but the text’s influence echoes throughout the entire history of Eurasian world mapping. (For a translation of Ptolemy’s text, see Berggren and Jones 2000.)

The single most significant feature of Ptolemy’s system for creating a world map is the graticule. This is the conceptual definition of 180 degrees of latitude between the poles, and 360 degrees of longitude counted from an arbitrarily determined “prime” meridian—the foundation for any mathematical projection of the sphere onto the plane. The tropic and polar circles do not correspond to whole degrees of latitude, although they were foundational to the long-enduring conception of climatic zones. Ptolemy does refer to the parallels as *klimata*, the Greeks’ word for parallel climates resulting from the sun’s changing angle with the earth. From these they had derived three zones of varying habitability. The middle or temperate group in the Northern Hemisphere formed the

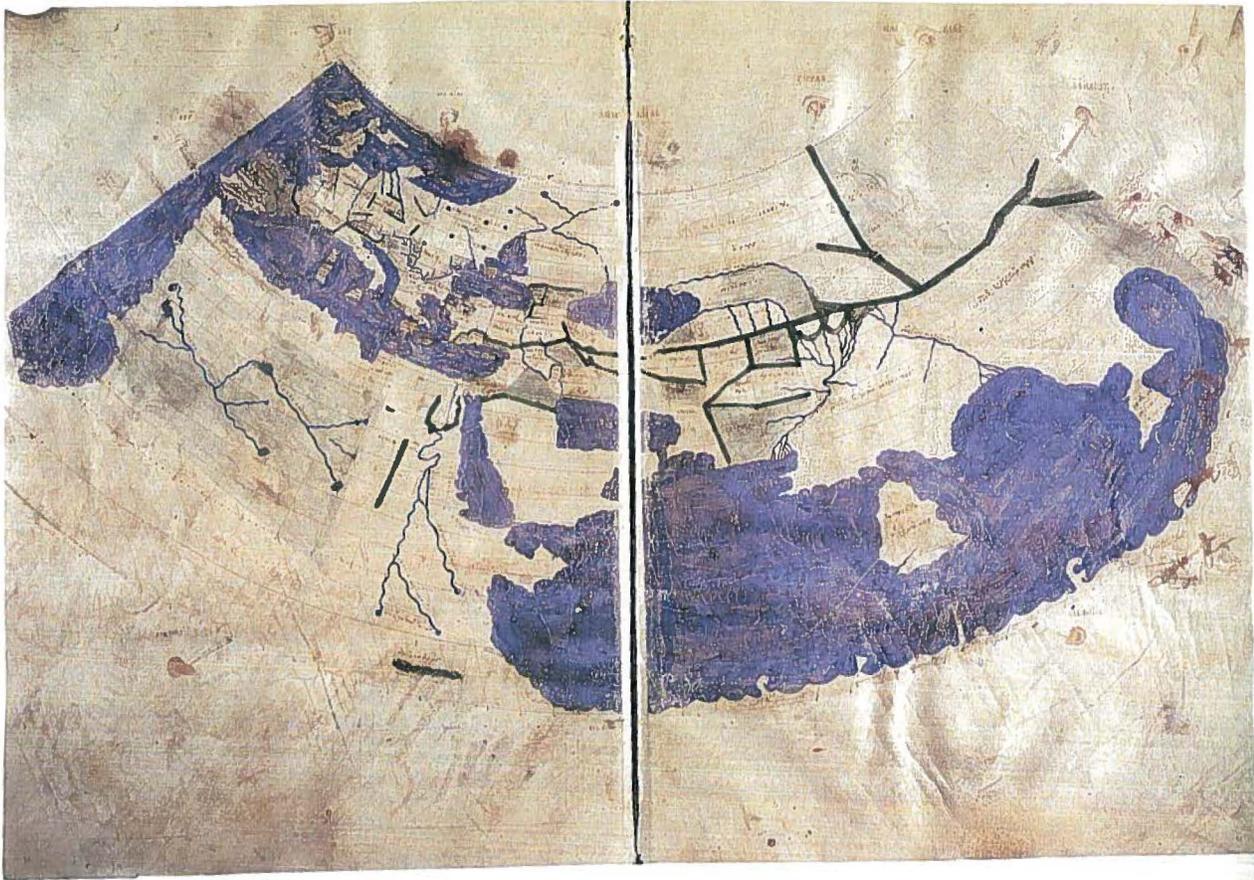


FIGURE 41
 Claudius Ptolemy, the *oikoumene* (inhabited earth)
 (13th century). © Biblioteca Apostolica Vaticana
 (Vatican) [URB.GR.82 fols. 60v-61r].

oikoumene (fig. 42); two frigid zones pole-ward of the Arctic and Antarctic circles were conventionally believed to be uninhabitable, as was the torrid zone between the tropic lines, by reason of heat. Only the two temperate zones supported human life, and only the oikoumene for certain. Its southern equivalent might or might not contain land; the ancients could not know, as the torrid-zone was thought to be impassable. Ptolemy actually challenged a number of these beliefs, mapping an oikoumene that stretches 180 degrees east from his prime meridian in the Canaries or Fortunate Isles (the Greek Hesperides and earthly paradise), and 80 degrees of latitude from the Baltic regions to about latitude 17° south. Its center was the temperate zone, and the Mediterranean its middle sea. The symmetry of a single world landmass penetrated by seas but surrounded by ocean⁸ was maintained by mapping the Indian Ocean as a “greater Mediterranean,” enclosed by a land bridge joining Africa to Southeast Asia.

Ptolemy’s world map may itself have been influenced by cartographic conceptions imported from the margins of Hellenistic cultural space. The puzzling appearance of Taprobane as a large island occupying the location of the Indian Subcontinent may have originated in Buddhist mapping of Jambudvīpa, with



FIGURE 58.
Abraham Ortelius, "Typus orbis terrarum" [Figure
of the Earthly Sphere] (1580).

cartographic devices such as maps and images of the continents to signify the papacy's global mission (Mangani 1998; R. Watson 2005).

World maps long retained a reserve of sacred authority even as they sought accuracy in projection and empirical content. Although printing made the world map more familiar and widespread, picturing the world long remained rare and charged with a certain wonder. This helps explain the endurance of the pictorial cosmographic map. Monarchs and princes competed for the symbolic authority of the world map, for the same reasons that priests and rulers in nonmodern cultures lay claim to the power associated with representing the world. Cosmography was the foundation of Louis XIV's royal iconography. His regime encouraged French scientific primacy in measuring and mapping the globe, and the king commissioned the Venetian cartographer and globe maker Vincenzo Coronelli to make the largest globe pair ever constructed to decorate his palace at Versailles. The celestial globe mapped the stars at the king's nativity, while its terrestrial partner emphasized the latest French geographic discoveries (Cosgrove 1999c).

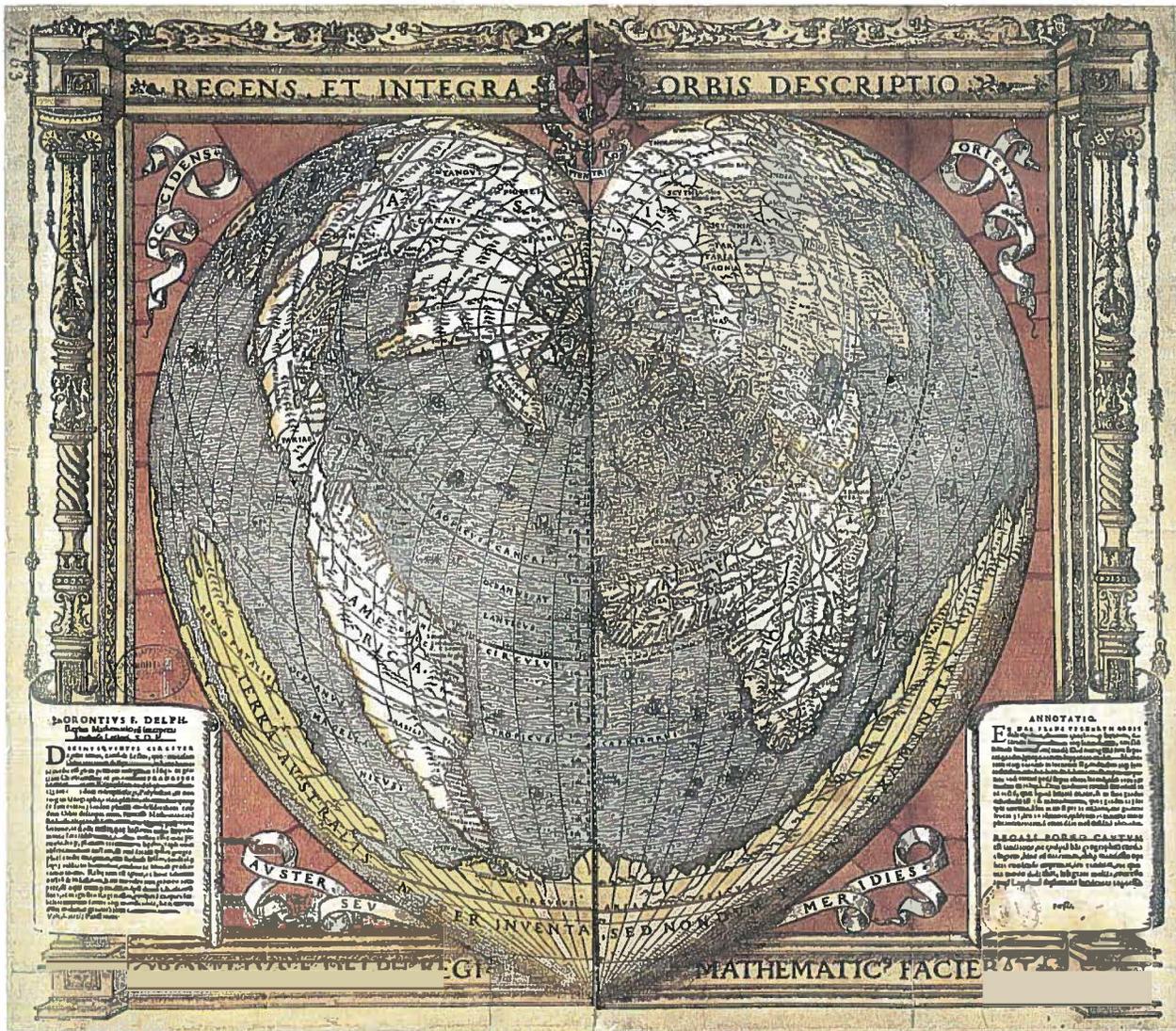


FIGURE 59.
Oronce Fine, "Recens et integra orbis descriptio"
(Current and Complete Description of the World)
[1536].

The emblematic qualities of world images have not wholly disappeared, despite the ubiquity of such images and the irreverence with which we treat the globe, from key fobs to beach balls. Devotees of environmentalism treat the 1972 Whole Earth photograph as a quasi-sacred image (fig. 32). Also, the world map remains a powerful symbol for any project that lays claim to universal values or concerns. Images of the globe are particularly popular among both Christian and Islamic charitable and missionary organizations. A secular equivalent is the United Nations, whose light-blue flag is marked with a polar-centered map showing the "land hemisphere" of continents gathered into close contact at the neutral North Pole. More commercially, newspapers and media

companies, airlines, telecommunications corporations, and other groups with claims to global reach find in the world map a simple, positive, and instantly recognizable symbol of universality.

Ethnographic and cosmopolitan aspects

The significance of mapping always extends beyond the description of physical earth, into the human implications of the “world.” The ethnocentricity of nonmodern world maps, on which “other” peoples beyond the normalized culture are figured as exotic or bizarre, is easy to spot: the “monstrous races” on the antipodean continent in medieval mappae mundi or the fantasy islands of women on the margins of Japanese and Korean maps are examples. The modern world map, on which world and globe coincide, is directly challenged with the issue of ethnocentrism. We have noted how Asians very quickly reworked the modern map to locate China or Japan nearer its center, and we have remarked on the criticisms made of the Greenwich “prime” meridian. Tensions between the modern map’s equalizing and universalizing effects and the focalizing qualities of any graphic construction are unavoidable. In picturing the globe as a single “world,” the modern world map is implicitly cosmopolitan. It shows us the earth as a whole, from the godlike perspective of the heavens—a perspective long associated with both imperial power and a cosmopolitan vision uprooted from the parochialism of local attachments (Cosgrove 2001, 2003). These ideas underlay the Renaissance idea of the “theater of the world,” the emblematic use of the world map, and the Stoic references on Ortelius’s “*Typus orbis terrarum*” (fig. 58), which was the model for many Chinese and Japanese world maps (Hostetler 2001; Società Geografica Italiana 2002). Yet the world map is always viewed through localized lenses, and the resolution of the resulting tensions appears in the use and design of the maps themselves.

An example of this is the frontispiece of the Venetian Giacomo Franco’s 1610 *Habiti d’huomini et donne venetiane* (Costumes of Venetian Men and Women; fig. 60). The map of Venice appears as a jewel within a crystal globe whose analogy with the earthly globe is intentional:

Here . . . is the design . . . of the marvelous city of Venice in spherical form, a real portrait of the world, whose resemblance is so close to nature, and made by the arts, similar to the orb of earth, those who well admire this design discover, from the height of a bird, the Arctic pole and the Antarctic and also from the East and the West with all the other parts that go around this world; similarly circled by water in a manner that seems the continent is entirely surrounded by the great ocean. (Quoted in Wilson 2005, 67)

The author goes on to explain the unusual orientation of the city, viewed from the east. It is intended to resemble the world map: the three central parts are the



FIGURE 60.
Frontispiece to Giacomo Franco, *Habi d'huomeni et donne venetiane* [Costumes of Venetian Men and Women] (1610).

continents of the old world, and the Island of Giudecca to the left is “in a guise that resembles the new world.” Franco deploys the universalizing qualities of the world map to suggest that the great commercial (and mapmaking) city is a microcosm of the whole world (Wilson 2005).

Habi d'huomeni et donne venetiane is a costume book, produced for an age when individual identity was more closely tied to dress than to the physical body or personality, dress codes were highly regulated, and understanding costume differences was a principal way of knowing the world. As Venice was a commercial center at the time, the costumes of many diverse peoples could be seen there; it was a cosmopolitan landscape in which costumes denoted customs (the words are the same in Italian). This directs us to a feature of seven-

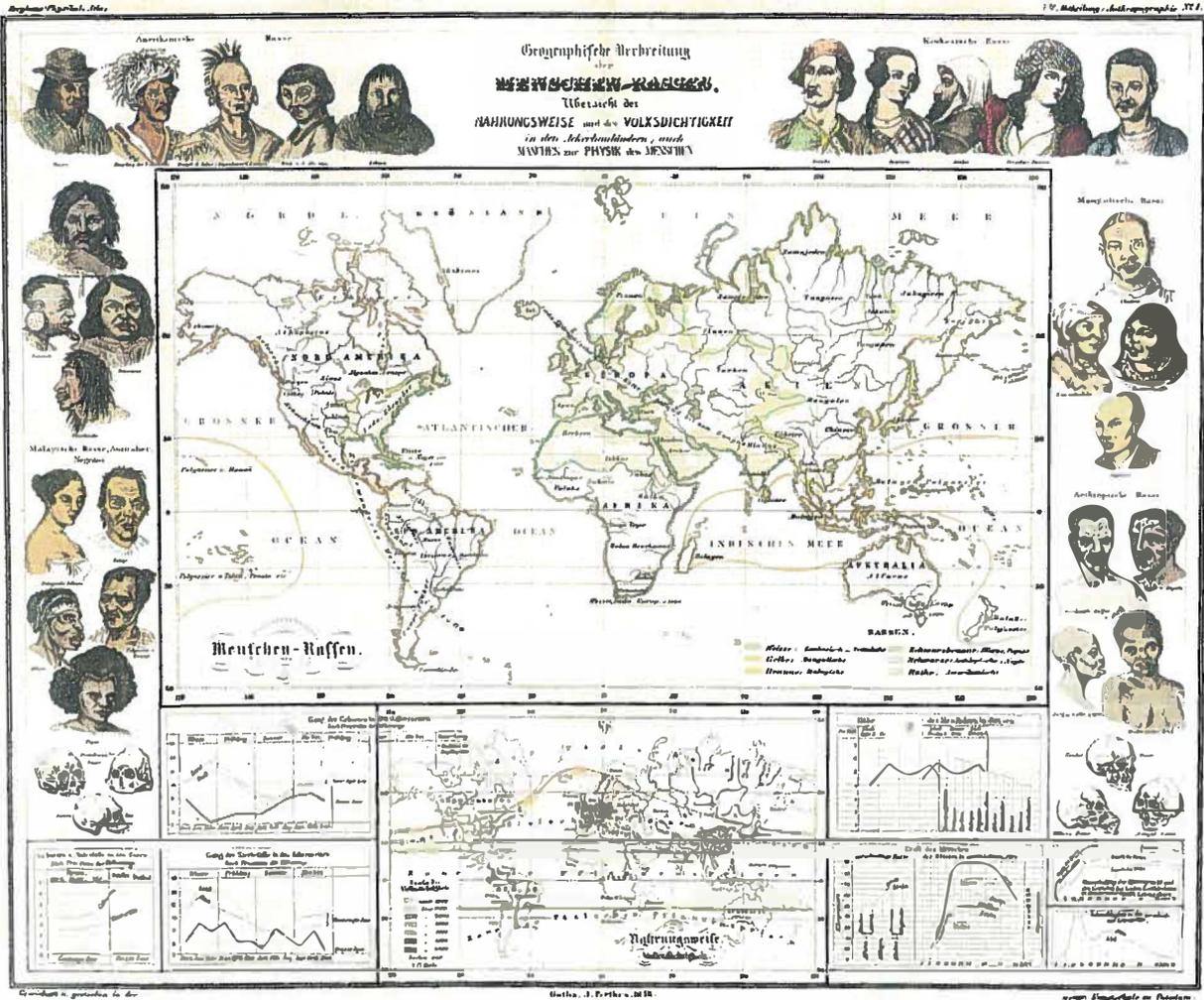
teenth-century world maps that appears strange today: the appearance around the maps' borders of differently costumed people. The great Dutch cosmographies whose borders illustrate the marvelous variety of the world often contain these ethnographic images, which reappear—often altered to reflect local perceptions—on Chinese and Japanese world maps of the same era (fig. 52).

The ethnographic border continues the tradition of representing strangeness at the edges of the world maps, and is itself succeeded by world maps of “races” in the nineteenth century. Heinrich Berghaus’s world map of human types, “Geographische Verbreitung der Menschen-Rassen” (Geographical Diffusion of the Human Races) replete with the graphs and charts of positive science, ranges around its borders human portraits grouped by region and “race” (fig. 61). Physiognomy has replaced costume as the marker of human difference, but the obviously caricatured features of Berghaus’s equivalents of “monstrous races,” and their implied inferiority to the (absent) white, northern European male, belie the map’s scientific objectivity. Connection between world map and human difference continues to be made in educational maps and atlases. They respond to our natural interest in human unity and diversity, but mapping human worlds onto the fixed outlines of continents carries unavoidable scientific risks.

THE REST OF THE STORY

Mapping the world involves much more than techniques of survey, projection, compilation, and graphic design, although each of these has its own history and contribution. Modern world maps that represent the vast and varied planetary globe within the space subtended by the individual human eye represents an extraordinary feat. There is no single map of the world, but a vast range of images that present different facets of the globe and its contents. Yet to speak of “the modern world map” is not meaningless. Although the term will generate a unique image for each individual, those images today agree in more ways than they differ. A map of the earth is a global cultural artifact, an extraordinary human accomplishment, produced by contributions from many cultures. It is a highly sophisticated scientific achievement, and each advance in the various technologies that coalesce within it renders it more detailed, flexible, and widely available. Google Earth is certainly not the last stage in its evolution.

Yet even the cursory survey of world mapping I have presented reveals that science and technology are only a part of the story. Of equal importance are such affective aspects as imagination, faith, fear, and desire. We spot these immediately in the world maps of nonmodern cultures, and even in early examples of the modern world map. For us humans, the earth is always more than its physical form and nature; it is, indeed, a *world*. In mapping the earth we cannot



avoid mapping a world. Today that world seems wholly visible, even transparent. Remote and close sensing devices that gather spatial data at any chosen scale, digitizing and communications technologies that circulate the data, and mapping techniques to picture it in exceptionally sophisticated graphic images at ultrahigh resolution seem to make the world instantly accessible. Yet today's "world" maps are as hued by the contingencies of our own times and the cultural world we occupy as any previous ones, and we are "mapped" into them as surely as Xiuhtechitli was mapped into the fifteenth-century Mesoamerican world. Because every "world" is social and imaginative as much as it is material, our own world maps will in due course come to seem as quaint as Jain mandalas or medieval mappae mundi seem to us today.

FIGURE 67. Heinrich Berghaus, "Geographische Verbreitung der Menschen-Rassen" [Geographical Diffusion of the Human Races] (1848).

Notes

1. M. Lewis and Weigen (1997) point out that the taken-for-granted “meta-geography” of the modern world map, its naming of continents, oceans, seas, and so on, has a specific history, and that it embodies a set of cultural assumptions that are rarely considered.
2. *Kwakwaka'wakw* is the preferred term for those from northern Vancouver Island and the nearby mainland who historically spoke Kwakwala. I use *Kwakiutl* in this instance for consistency with historical references.
3. The true form of Earth is an oblate spheroid, widened at the equator by some 41 miles (66 km). That difference is, of course, too small to be noticeable at any conceivably useful scale of constructed globe.
4. The term *othering* derives from psychologically based theoretical discussions of self and identity which many see in their individual and collective expressions as being dependent on the construction of a different “Other.”
5. I use the term *nonmodern* to designate cultural expressions that are historically or geographically outside the scientific culture that began to emerge in fifteenth-century Europe and became its dominant mode of formal knowledge in the eighteenth century, now extended across the globe. The term avoids the awkwardness and progressive assumptions of *premodern*.
6. Cosmography refers to the study of the visible universe and involves astronomy and geography.
7. A painted Bhutanese temple mandala (illustrated in Schwartzberg 1994a, p. 622), for example, offers an easily legible rendering of this Buddhist world map. A central set of polygons represents Mount Meru surrounded by seven squares signifying the golden mountain ranges and water basins. The ocean and four continents lie beyond, with the world's enclosing mountain range represented by a solid circle. Jambudvipa occupies the center of the lowest quarter segment, indicating a northerly oriented map (many Buddhist maps place south to the right), with two subsidiary continents and its own encircling ocean. Various pictorial images occupy the topographic spaces and serve as devotional icons within the map.
8. *Ocean* and *sea* are among those “metageographic” terms that lack scientific definition. They derive from the ancient Greek distinction between the Mediterranean and Black seas, whose coasts were known and navigated, and the waters beyond the Pillars of Hercules (Straits of Gibraltar) that were tidal and thought by the Greeks to be of a different elemental constitution: a mixed “chaos” of unsorted elements that became more viscous as one sailed north toward the pole. See Romm 1992.
9. The development of geodesy in the late eighteenth century gave rise to a second wave of new projections using geodesic science as the foundation for national topographic mapping, as I point out below. Today, packaged

computer programs allow the individual with little or no mathematical skill to generate virtually any possible projection at will.

10. Gores are the elongated strips drawn or printed with geographic information that are pasted onto the sphere to produce the globe. They are technically and graphically complicated to design and produce.
11. Isolines are lines on a map connecting points of equal value.