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Name: \_\_\_\_\_

## Image of European Surveying Instruments

Europeans used a wide range of instruments for surveying and gunnery by 1600. Here we see various instruments for figuring the height or depth of an object by making it the third side of a triangle. What does this image show us about European ideas of the Earth and the heavens? How would this knowledge be useful in war as well as surveying? What does it suggest about European ideas of nature?

### THINKING HISTORICALLY

Compare this European image with the previous Chinese image. If these images are at all representative of their cultures, what does the comparison suggest about European and Chinese attitudes toward nature? How do these images support or challenge Lynn White Jr.'s thesis?



Figure 14.4 European Surveying, c. 1600.

Source: The Granger Collection, New York.

Source: Kevin Reilly, *The West and the World: A History of Civilization*, 2nd ed. (New York: Harper & Row, 1989), 344.

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Period: \_\_\_\_\_

Date: \_\_\_\_\_

## LYNDA NORENE SHAFFER

### Southernization

The author of this selection began her career as a historian of China, but she is currently a world historian, having published books on Native American, Southeast Asian, and Chinese history. Shaffer coins the term *Southernization* to suggest that *Westernization* was preceded by an earlier "southern" process of technological expansion that eventually made Westernization possible. Which of her examples of Southernization do you find most important in changing the world? Which least significant? Did India and Indian Ocean societies of the early Middle Ages play a role like that of the West today?

### THINKING HISTORICALLY

Shaffer did not write this essay to criticize Lynn White Jr., nor does her essay address precisely the same issues. Our exercise here is not the relatively simple task of weighing two debaters on a single issue. Rather, Shaffer's essay challenges some of the assumptions and arguments made by White and many other historians when they discuss the history of technology. What are some of the assumptions and arguments of White that Shaffer challenges? How might you use Shaffer to challenge White's grand theory? Which essay provides a more satisfying explanation of the origins of modern science and technology?

The term *Southernization* is a new one. It is used here to refer to a multifaceted process that began in Southern Asia and spread from there to various other places around the globe. The process included so many interrelated strands of development that it is impossible to do more here than sketch out the general outlines of a few of them. Among the most important that will be omitted from this discussion are the metallurgical, the medical, and the literary. Those included are the development of mathematics; the production and marketing of subtropical or tropical spices; the pioneering of new trade routes; the cultivation, processing, and marketing of southern crops such as sugar and cotton; and the development of various related technologies.

The term *Southernization* is meant to be analogous to *Westernization*. Westernization refers to certain developments that first occurred in western Europe. Those developments changed Europe and eventually

Source: Lynda Norene Shaffer, "Southernization," *Journal of World History* 5 (Spring 1994):

spread to other places and changed them as well. In the same way, southernization changed Southern Asia and later spread to other areas, which then underwent a process of change.

Southernization was well under way in Southern Asia by the fifth century C.E., during the reign of India's Gupta kings (320–535 C.E.). It was by that time already spreading to China. In the eighth century various elements characteristic of Southernization began spreading through the lands of the Muslim caliphates. Both in China and in the lands of the caliphate, the process led to dramatic changes, and by the year 1200 it was beginning to have an impact on the Christian Mediterranean. One could argue that within the Northern Hemisphere, by this time the process of Southernization had created an Eastern Hemisphere characterized by a rich south and a north that was poor in comparison. And one might even go so far as to suggest that in Europe and its colonies, the process of Southernization laid the foundation for Westernization.

### The Indian Beginning

Southernization was the result of developments that took place in many parts of southern Asia, both on the Indian subcontinent and in Southeast Asia. By the time of the Gupta kings, several of its constituent parts already had a long history in India. Perhaps the oldest strand in the process was the cultivation of cotton and the production of cotton textiles for export. Cotton was first domesticated in the Indus River valley some time between 2300 and 1760 B.C.E., and by the second millennium B.C.E., the Indians had begun to develop sophisticated dyeing techniques. During these early millennia Indus River valley merchants are known to have lived in Mesopotamia, where they sold cotton textiles.

In the first century C.E. Egypt became an important overseas market for Indian cottons. By the next century there was a strong demand for these textiles both in the Mediterranean and in East Africa, and by the fifth century they were being traded in Southeast Asia. The Indian textile trade continued to grow throughout the next millennium. Even after the arrival of European ships in Asian ports at the turn of the sixteenth century, it continued unscathed. According to one textile expert, "India virtually clothed the world" by the mid-eighteenth century. The subcontinent's position was not undermined until Britain's Industrial Revolution, when steam engines began to power the production of cotton textiles.

Another strand in the process of Southernization, the search for new sources of bullion, can be traced back in India to the end of the Mauryan Empire (321–185 B.C.E.). During Mauryan rule Siberia had been India's main source of gold, but nomadic disturbances in Central Asia disrupted the traffic between Siberia and India at about the time that the Mauryans

fell. Indian sailors then began to travel to the Malay peninsula and the islands of Indonesia in search of an alternative source, which they most likely "discovered" with the help of local peoples who knew the sites. (This is generally the case with bullion discoveries, including those made by Arabs and Europeans.) What the Indians (and others later on) did do was introduce this gold to international trade routes.

The Indians' search for gold may also have led them to the shores of Africa. Although its interpretation is controversial, some archaeological evidence suggests the existence of Indian influence on parts of East Africa as early as 300 C.E. There is also one report that gold was being sought in East Africa by Ethiopian merchants, who were among India's most important trading partners.

The sixth-century Byzantine geographer Cosmas Indicopleustes described Ethiopian merchants who went to some location inland from the East African coast to obtain gold. "Every other year they would sail far to the south, then march inland, and in return for various made-up articles they would come back laden with ingots of gold." The fact that the expeditions left every other year suggests that it took two years to get to their destination and return. If so, their destination, even at this early date, may have been Zimbabwe. The wind patterns are such that sailors who ride the monsoon south as far as Kilwa can catch the return monsoon to the Red Sea area within the same year. But if they go beyond Kilwa to the Zambezi River, from which they might go inland to Zimbabwe, they cannot return until the following year.

Indian voyages on the Indian Ocean were part of a more general development, more or less contemporary with the Mauryan Empire, in which sailors of various nationalities began to knit together the shores of the "Southern Ocean," a Chinese term referring to all the waters from the South China Sea to the eastern coast of Africa. During this period there is no doubt that the most intrepid sailors were the Malays, peoples who lived in what is now Malaysia, Indonesia, the southeastern coast of Vietnam, and the Philippines.

Sometime before 300 B.C.E. Malay sailors began to ride the monsoons, the seasonal winds that blow off the continent of Asia in the colder months and onto its shores in the warmer months. Chinese records indicate that by the third century B.C.E. "Kunlun" sailors, the Chinese term for the Malay seamen, were sailing north to the southern coasts of China. They may also have been sailing west to India, through the straits now called Malacca and Sunda. If so they may have been the first to establish contact between India and Southeast Asia.

Malay sailors had reached the eastern coast of Africa at least by the first century B.C.E., if not earlier. Their presence in East African waters is testified to by the peoples of Madagascar, who still speak a Malayo-Polynesian language. Some evidence also suggests that Malay sailors had settled in the Red Sea area. Indeed, it appears that they were the first to

develop a long-distance trade in a southern spice. In the last centuries B.C.E., if not earlier, Malay sailors were delivering cinnamon from South China Sea ports to East Africa and the Red Sea.

By about 400 C.E. Malay sailors could be found two-thirds of the way around the world, from Easter Island to East Africa. They rode the monsoons without a compass, out of sight of land, and often at latitudes below the equator where the northern pole star cannot be seen. They navigated by the wind and the stars, by cloud formations, the color of the water, and swell and wave patterns on the ocean's surface. They could discern the presence of an island some thirty miles from its shores by noting the behavior of birds, the animal and plant life in the water, and the swell and wave patterns. Given their manner of sailing, their most likely route to Africa and the Red Sea would have been by way of the island clusters, the Maldives, the Chagos, the Seychelles, and the Comoros.

Malay ships used balance lug sails, which were square in shape and mounted so that they could pivot. This made it possible for sailors to tack against the wind, that is, to sail into the wind by going diagonally against it, first one way and then the other. Due to the way the sails were mounted, they appeared somewhat triangular in shape, and thus the Malays' balance lug sail may well be the prototype of the triangular lateen, which can also be used to tack against the wind. The latter was invented by both the Polynesians to the Malays' east and by the Arabs to their west, both of whom had ample opportunity to see the Malays' ships in action.

It appears that the pepper trade developed after the cinnamon trade. In the first century C.E. Southern India began supplying the Mediterranean with large quantities of pepper. Thereafter, Indian merchants could be found living on the island of Socotra, near the mouth of the Red Sea, and Greek-speaking sailors, including the anonymous author of the *Periplus of the Erythraean Sea*,<sup>1</sup> could be found sailing in the Red Sea and riding the monsoons from there to India.

Indian traders and shippers and Malay sailors were also responsible for opening up an all-sea route to China. The traders' desire for silk drew them out into dangerous waters in search of a more direct way to its source. By the second century C.E. Indian merchants could make the trip by sea, but the route was slow, and it took at least two years to make a round trip. Merchants leaving from India's eastern coast rounded the shores of the Bay of Bengal. When they came to the Isthmus of Kra, the narrowest part of the Malay peninsula, the ships were unloaded, and the goods were portaged across to the Gulf of Thailand. The cargo was then reloaded on ships that rounded the gulf until they reached Funan, a kingdom on what is now the Kampuchea [Cambodia]-Vietnam

border. There they had to wait for the winds to shift, before embarking upon a ship that rode the monsoon to China.

Some time before 400 C.E. travelers began to use a new all-sea route to China, a route that went around the Malay peninsula and thus avoided the Isthmus of Kra portage. The ships left from Sri Lanka and sailed before the monsoon, far from any coasts, through either the Strait of Malacca or the Strait of Sunda into the Java Sea. After waiting in the Java Sea port for the winds to shift, they rode the monsoon to southern China. The most likely developers of this route were Malay sailors, since the new stopover ports were located within their territories.

Not until the latter part of the fourth century, at about the same time as the new all-sea route began to direct commercial traffic through the Java Sea, did the fine spices—cloves, nutmeg, and mace—begin to assume importance on international markets. These rare and expensive spices came from the Moluccas, several island groups about a thousand miles east of Java. Cloves were produced on about five minuscule islands off the western coast of Halmahera; nutmeg and mace came from only a few of the Banda Islands, some ten islands with a total area of seventeen square miles, located in the middle of the Banda Sea. Until 1621 these Moluccan islands were the only places in the world able to produce cloves, nutmeg, and mace in commercial quantities. The Moluccan producers themselves brought their spices to the international markets of the Java Sea ports and created the market for them.

It was also during the time of the Gupta kings, around 350 C.E., that the Indians discovered how to crystallize sugar. There is considerable disagreement about where sugar was first domesticated. Some believe that the plant was native to New Guinea and domesticated there, and others argue that it was domesticated by Southeast Asian peoples living in what is now southern China. In any case, sugar cultivation spread to the Indian subcontinent. Sugar, however, did not become an important item of trade until the Indians discovered how to turn sugarcane juice into granulated crystals that could be easily stored and transported. This was a momentous development, and it may have been encouraged by Indian sailing, for sugar and clarified butter (ghee) were among the dietary mainstays of Indian sailors.

The Indians also laid the foundation for modern mathematics during the time of the Guptas. Western numerals, which the Europeans called Arabic since they acquired them from the Arabs, actually come from India. (The Arabs call them Hindi numbers.) The most significant feature of the Indian system was the invention of the zero as a number concept. The oldest extant treatise that uses the zero in the modern way is a mathematical appendix attached to Aryabhata's text on astronomy, which is dated 499 C.E.

The Indian zero made the place-value system of writing numbers superior to all others. Without it, the use of this system, base ten or

<sup>1</sup> Written about 60 C.E. [Ed.]

otherwise, was fraught with difficulties and did not seem any better than alternative systems. With the zero the Indians were able to perform calculations rapidly and accurately, to perform much more complicated calculations, and to discern mathematical relationships more aptly. These numerals and the mathematics that the Indians developed with them are now universal—just one indication of the global significance of Southernization.

As a result of these developments India acquired a reputation as a place of marvels, a reputation that was maintained for many centuries after the Gupta dynasty fell. As late as the ninth century Amr ibn Bahr al Jahiz (c. 776–868), one of the most influential writers of Arabic, had the following to say about India:

As regards the Indians, they are among the leaders in astronomy, mathematics—in particular, they have Indian numerals—and medicine; they alone possess the secrets of the latter, and use them to practice some remarkable forms of treatment. They have the art of carving statues and painted figures. They possess the game of chess, which is the noblest of games and requires more judgment and intelligence than any other. They make Kedah swords, and excel in their use. They have splendid music. . . . They possess a script capable of expressing the sounds of all languages, as well as many numerals. They have a great deal of poetry, many long treatises, and a deep understanding of philosophy and letters; the book *Kalila wa-Dimna* originated with them. They are intelligent and courageous. . . . Their sound judgment and sensible habits led them to invent pins, cork, toothpicks, the drape of clothes, and the dyeing of hair. They are handsome, attractive, and forbearing; their women are proverbial; and their country produces the matchless Indian aloes which are supplied to kings. They were the originators of the science of *fikr*, by which a poison can be counteracted after it has been used, and of astronomical reckoning, subsequently adopted by the rest of the world. When Adam descended from Paradise, it was to their land that he made his way.

### The Southernization of China

These Southern Asian developments began to have a significant impact on China after 350 C.E. The Han dynasty had fallen in 221 C.E., and for more than 350 years thereafter China was ruled by an ever-changing collection of regional kingdoms. During these centuries Buddhism became increasingly important in China, Buddhist monasteries spread throughout the disunited realm, and cultural exchange between India and China grew accordingly. By 581, when the Sui dynasty reunited the empire,

processes associated with Southernization had already had a major impact on China. The influence of Southernization continued during the Tang (618–906) and Sung (960–1279) dynasties. One might even go so far as to suggest that the process of Southernization underlay the revolutionary social, political, economic, and technological developments of the Tang and Sung.

The Chinese reformed their mathematics, incorporating the advantages of the Indian system, even though they did not adopt the Indian numerals at that time. They then went on to develop an advanced mathematics, which was flourishing by the time of the Sung dynasty. Cotton and indigo became well established, giving rise to the blueblack peasant garb that is still omnipresent in China. Also in the Sung period the Chinese first developed cotton canvas, which they used to make a more efficient sail for ocean-going ships.

Although sugar had long been grown in some parts of southern China it did not become an important crop in this region until the process of Southernization was well under way. The process also introduced new varieties of rice. The most important of these was what the Chinese called Champa rice, since it came to China from Champa, a Malay kingdom located on what is now the southeastern coast of Vietnam. Champa rice was a drought-resistant, early ripening variety that made it possible to extend cultivation up well-watered hillsides, thereby doubling the area of rice cultivation in China. . . .

In southern China the further development of rice production brought significant changes in the landscape. Before the introduction of Champa rice, rice cultivation had been confined to lowlands, deltas, basins, and river valleys. Once Champa rice was introduced and rice cultivation spread up the hillsides, the Chinese began systematic terracing and made use of sophisticated techniques of water control on mountain slopes. Between the mid-eighth and the early twelfth century the population of southern China tripled, and the total Chinese population doubled. According to Sung dynasty household registration figures for 1102 and 1110—figures that Sung dynasty specialists have shown to be reliable—there were 100 million people in China by the first decade of the twelfth century.

Before the process of Southernization, northern China had always been predominant, intellectually, socially, and politically. The imperial center of gravity was clearly in the north, and the southern part of China was perceived as a frontier area. But Southernization changed this situation dramatically. By 600, southern China was well on its way to becoming the most prosperous and most commercial part of the empire. The most telling evidence for this is the construction of the Grand Canal, which was completed around 610, during the Sui dynasty. Even though the rulers of the Sui had managed to put the pieces of the empire back together in 581 and rule the whole of China again from a single northern capital, they were dependent on the new southern crops. Thus it is no

coincidence that this dynasty felt the need to build a canal that could deliver southern rice to northern cities.

The T'ang dynasty, when Buddhist influence in China was especially strong, saw two exceedingly important technological innovations—the invention of printing and gunpowder. These developments may also be linked to Southernization. Printing seems to have developed within the walls of Buddhist monasteries between 700 and 750, and subtropical Szechuan was one of the earliest centers of the art. The invention of gunpowder in China by Taoist alchemists in the ninth century may also be related to the linkages between India and China created by Buddhism. In 644 an Indian monk identified soils in China that contained saltpeter and demonstrated the purple flame that results from its ignition. As early as 919 C.E. gunpowder was used as an igniter in a flamethrower, and the tenth century also saw the use of flaming arrows, rockets, and bombs thrown by catapults. The earliest evidence of a cannon or bombard (1127) has been found in Szechuan, quite near the Tibetan border, across the Himalayas from India.

By the time of the Sung the Chinese also had perfected the “south-pointing needle,” otherwise known as the compass. Various prototypes of the compass had existed in China from the third century B.C.E., but the new version developed during the Sung was particularly well suited for navigation. Soon Chinese mariners were using the south-pointing needle on the oceans, publishing “needle charts” for the benefit of sea captains, and following “needle routes” on the Southern Ocean.

Once the Chinese had the compass they, like Columbus, set out to find a direct route to the spice markets of Java and ultimately to the Spice Islands in the Moluccas. Unlike Columbus, they found them. They did not bump into an obstacle, now known as the Western Hemisphere, on their way, since it was not located between China and the Spice Islands. If it had been so situated, the Chinese would have found it some 500 years before Columbus.

Cities on China's southern coasts became centers of overseas commerce. Silk remained an important export, and by the T'ang dynasty it had been joined by a true porcelain, which was developed in China sometime before 400 C.E. China and its East Asian neighbors had a monopoly on the manufacture of true porcelain until the early eighteenth century. Many attempts were made to imitate it, and some of the resulting imitations were economically and stylistically important. China's southern ports were also exporting to Southeast Asia large quantities of ordinary consumer goods, including iron hardware, such as needles, scissors, and cooking pots. Although iron manufacturing was concentrated in the north, the large quantity of goods produced was a direct result of the size of the market in southern China and overseas. Until the British Industrial Revolution of the eighteenth century, no other place ever equaled the iron production of Sung China.

## The Muslim Caliphates

In the seventh century C.E., Arab cavalries, recently converted to the new religion of Islam, conquered eastern and southern Mediterranean shores that had been Byzantine (and Christian), as well as the Sassanian empire (Zoroastrian) in what is now Iraq and Iran. In the eighth century they went on to conquer Spain and Turko-Iranian areas of Central Asia, as well as northwestern India. Once established on the Indian frontier, they became acquainted with many of the elements of Southernization.

The Arabs were responsible for the spread of many important crops, developed or improved in India, to the Middle East, North Africa, and Islamic Spain. Among the most important were sugar, cotton, and citrus fruits. Although sugarcane and cotton cultivation may have spread to Iraq and Ethiopia before the Arab conquests, only after the establishment of the caliphates did these southern crops have a major impact throughout the Middle East and North Africa.

The Arabs were the first to import large numbers of enslaved Africans in order to produce sugar. Fields in the vicinity of Basra, at the northern end of the Persian Gulf, were the most important sugar-producing areas within the caliphates, but before this land could be used, it had to be desalinated. To accomplish this task, the Arabs imported East African (Zanj) slaves. This African community remained in the area, where they worked as agricultural laborers. The famous writer al Jahiz, whose essay on India was quoted earlier, was a descendant of Zanj slaves. In 869, one year after his death, the Zanj slaves in Iraq rebelled. It took the caliphate fifteen years of hard fighting to defeat them, and thereafter Muslim owners rarely used slaves for purposes that would require their concentration in large numbers.

The Arabs were responsible for moving sugarcane cultivation and sugar manufacturing westward from southern Iraq into other relatively arid lands. Growers had to adapt the plant to new conditions, and they had to develop more efficient irrigation technologies. By 1000 or so sugarcane had become an important crop in the Yemen; in Arabian oases; in irrigated areas of Syria, Lebanon, Palestine, Egypt, and the Maghrib; in Spain; and on Mediterranean islands controlled by Muslims. By the tenth century cotton also had become a major crop in the lands of the caliphate, from Iran and Central Asia to Spain and the Mediterranean islands. Cotton industries sprang up wherever the plant was cultivated, producing for both local and distant markets. . . .

Under Arab auspices, Indian mathematics followed the same routes as the crops. Al-Kharazmi (c. 780–847) introduced Indian mathematics to the Arabic-reading world in his *Treatise on Calculation with the Hindu Numerals*, written around 825. Mathematicians within the caliphates then could draw upon the Indian tradition, as well as the Greek and Persian. On this foundation Muslim scientists of many nationalities,

including al-Bartani (d. 929), who came from the northern reaches of the Mesopotamian plain, and the Persian Omar Khayyám (d. 1123), made remarkable advances in both algebra and trigonometry.

The Arab conquests also led to an increase in long-distance commerce and the “discovery” of new sources of bullion. Soon after the Abbasid caliphate established its capital at Baghdad, the caliph al-Mansur (r. 745–75) reportedly remarked, “This is the Tigris; there is no obstacle between us and China; everything on the sea can come to us.” By this time Arab ships were plying the maritime routes from the Persian Gulf to China, and they soon outnumbered all others using these routes. By the ninth century they had acquired the compass (in China, most likely), and they may well have been the first to use it for marine navigation, since the Chinese do not seem to have used it for this purpose until after the tenth century.

... [Similarly,] the Arabs “pioneered” or improved an existing long-distance route across the Sahara, an ocean of sand rather than water. Routes across this desert had always existed, and trade and other contacts between West Africa and the Mediterranean date back at least to the Phoenician period. Still, the numbers of people and animals crossing this great ocean of sand were limited until the eighth century when Arabs, desiring to go directly to the source of the gold,<sup>2</sup> prompted an expansion of trade across the Sahara. Also during the eighth century Abdul al-Rahman, an Arab ruler of Morocco, sponsored the construction of wells on the trans-Saharan route from Sijilmasa to Wadlارا to facilitate this traffic. This Arab “discovery” of West African gold eventually doubled the amount of gold in international circulation. East Africa, too, became a source of gold for the Arabs. By the tenth century Kilwa had become an important source of Zimbabwean gold.

### Developments after 1200: The Mongolian Conquest and the Southernization of the European Mediterranean

By 1200 the process of Southernization had created a prosperous south from China to the Muslim Mediterranean. Although mathematics, the pioneering of new ocean routes, and “discoveries” of bullion are not inextricably connected to locations within forty degrees of the equator, several crucial elements in the process of Southernization were closely linked to latitude. Cotton generally does not grow above the fortieth parallel. Sugar, cinnamon, and pepper are tropical or subtropical crops, and the fine spices will grow only on particular tropical islands. Thus for many centuries the more southern parts of Asia

and the Muslim Mediterranean enjoyed the profits that these developments brought, while locations that were too far north to grow these southern crops were unable to participate in such lucrative agricultural enterprises.

The process of Southernization reached its zenith after 1200, in large part because of the tumultuous events of the thirteenth century. During that century in both hemispheres there were major transformations in the distribution of power, wealth, and prestige. In the Western Hemisphere several great powers went down. Cahokia (near East St. Louis, Illinois), which for three centuries had been the largest and most influential of the Mississippian mound-building centers, declined after 1200, and in Mexico Toltec power collapsed. In the Mediterranean the prestige of the Byzantine empire was destroyed when Venetians seized its capital in 1204. From 1212 to 1270 the Christians conquered southern Spain, except for Granada. In West Africa, Ghana fell to Sosso, and so did Mali, one of Ghana's allies. But by about 1230 Mali, in the process of seeking its own revenge, had created an empire even larger than Ghana's. At the same time Zimbabwe was also becoming a major power in southern Africa.

The grandest conquerors of the thirteenth century were the Central Asians. Turkish invaders established the Delhi sultanate in India. Mongolian cavalries devastated Baghdad, the seat of the Abbasid caliphate since the eighth century, and they captured Kiev, further weakening Byzantium. By the end of the century they had captured China, Korea, and parts of mainland Southeast Asia as well.

Because the Mongols were pagans at the time of their conquests, the western Europeans cheered them on as they laid waste to one after another Muslim center of power in the Middle East. The Mongols were stopped only when they encountered the Mamluks of Egypt at Damascus. In East Asia and Southeast Asia only the Japanese and the Javanese were able to defeat them. The victors in Java went on to found Majapahit, whose power and prestige then spread through maritime Southeast Asia.

Both hemispheres were reorganized profoundly during this turmoil. Many places that had flourished were toppled, and power gravitated to new locales. In the Eastern Hemisphere the Central Asian conquerors had done great damage to traditional southern centers just about everywhere, except in Africa, southern China, southern India, and maritime Southeast Asia. At the same time the Mongols' control of overland routes between Europe and Asia in the thirteenth and early fourteenth centuries fostered unprecedented contacts between Europeans and peoples from those areas that had long been southernized. Marco Polo's long sojourn in Yuan Dynasty China is just one example of such interaction.

Under the Mongols overland trade routes in Asia shifted north and converged on the Black Sea. After the Genoese helped the Byzantines to

<sup>2</sup> One of the sources of gold was the area called the “gold coast” of Africa, south of the Sahara centered in what is today Ghana. [Ed.]

retake Constantinople from the Venetians in 1261, the Genoese were granted special privileges of trade in the Black Sea. Italy then became directly linked to the Mongolian routes. Genoese traders were among the first and were certainly the most numerous to open up trade with the Mongolian states in southern Russia and Iran. In the words of one Western historian, in their Black Sea colonies they “admitted to citizenship” people of many nationalities, including those of “strange background and questionable belief,” and they “wound up christening children of the best ancestry with such uncanny names as Saladin, Hethum, or Hulagu.”

Such contacts contributed to the Southernization of the Christian Mediterranean during this period of Mongolian hegemony. Although European conquerors sometimes had taken over sugar and cotton lands in the Middle East during the Crusades, not until some time after 1200 did the European-held Mediterranean islands become important exporters. Also after 1200 Indian mathematics began to have a significant impact in Europe. Before that time a few western European scholars had become acquainted with Indian numerals in Spain, where the works of al-Kharazmi, al-Battani, and other mathematicians had been translated into Latin. Nevertheless, Indian numerals and mathematics did not become important in western Europe until the thirteenth century after the book *Liber abaci* (1202), written by Leonardo Fibonacci of Pisa (c. 1170–1250), introduced them to the commercial centers of Italy. Leonardo had grown up in North Africa (in what is now Bejala, Algeria), where his father, consul over the Pisan merchants in that port, had sent him to study calculation with an Arab master.

In the seventeenth century, when Francis Bacon observed the “force and virtue and consequences of discoveries,” he singled out three technologies in particular that “have changed the whole face and state of things throughout the world.” These were all Chinese inventions—the compass, printing, and gunpowder. All three were first acquired by Europeans during this time of hemispheric reorganization.

It was most likely the Arabs who introduced the compass to Mediterranean waters, either at the end of the twelfth or in the thirteenth century. Block printing, gunpowder, and cannon appeared first in Italy in the fourteenth century, apparently after making a single great leap from Mongolian-held regions of East Asia to Italy. How this great leap was accomplished is not known, but the most likely scenario is one suggested by Lynn White Jr., in an article concerning how various other Southern (rather than Eastern) Asian technologies reached western Europe at about this time. He thought it most likely that they were introduced by “Tatar” slaves, Lama Buddhists from the frontiers of China whom the Genoese purchased in Black Sea marts and delivered to Italy. By 1450 when this trade reached its peak, there were thousands of these Asian slaves in every major Italian city. . . .

## The Rise of Europe's North

The rise of the north, or more precisely, the rise of Europe's northwest, began with the appropriation of those elements of Southernization that were not confined by geography. In the wake of their southern European neighbors, they became partially southernized, but they could not engage in all aspects of the process due to their distance from the equator. Full Southernization and the wealth that we now associate with northern Europe came about only after their outright seizure of tropical and subtropical territories and their rounding of Africa and participation in Southern Ocean trade. . . .

Even though the significance of indigenous developments in the rise of northwestern Europe should not be minimized, it should be emphasized that many of the most important causes of the rise of the West are not to be found within the bounds of Europe. Rather, they are the result of the transformation of western Europe's relationships with other regions of the Eastern Hemisphere. Europe began its rise only after the thirteenth-century reorganization of the Eastern Hemisphere facilitated its Southernization, and Europe's northwest did not rise until it too was reaping the profits of Southernization. Thus the rise of the North Atlantic powers should not be oversimplified so that it appears to be an isolated and solely European phenomenon, with roots that spread no farther afield than Greece. Rather, it should be portrayed as one part of a hemisphere-wide process, in which a northwestern Europe ran to catch up with a more developed south—a race not completed until the eighteenth century.

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## ~~JARED DIAMOND Easter Island's End~~

~~In comparison with the grand theories of White and Shaffer, an essay on a small island in the Pacific might seem to be an exercise in the recent vogue of small-bore “micro-history.” It is not. Jared Diamond, author of *Guns, Germs, and Steel*, uses small examples to big effect. In this selection and in his larger book-length treatment *Collapse: How Societies Choose to Fail or Succeed*, Diamond teases a global lesson from the history of tiny Easter Island. What is that lesson? What does~~