

John F. Richards, The Unending Frontier, (2006).

Chapter 9

The Columbian Exchange

The West Indies

Christopher Columbus's voyages were the first systematic projection of state power to the Western Hemisphere. News of this feat inspired the imaginations of Renaissance statesmen and religious leaders. The monarchies of Europe, supported by rapidly growing organizational sophistication, economic resources, and military strength, saw the New World as a source of riches to be ruthlessly exploited. Gold and silver, human labor, timber, fertile lands, and new plants could all be put to the service of the state at home. The Church saw among the strange peoples of the New World a fertile source of new converts. Gold and the cross were the two motives for sending annual fleets to the New World. The pattern had long been set by the reconquest of Iberia from the Moors and then the stepping-stone conquest and occupation of the island of Madeira, the Azores, and the Canary Islands. The Spanish, along with the Portuguese, were the first European kingdoms to conquer and colonize vast areas of the American continent.

The first Spanish conquests after 1492 were in the islands of the Greater and Lesser Antilles in the Caribbean. Within three decades, between 1519 and 1540, the Spanish moved to the mainland and subjugated the densely populated heartlands of Mexico and Peru. By midcentury, Spain had claimed sovereignty over peoples occupying some 2 million square kilometers in the Americas. Only the area assigned to Portugal in Brazil was beyond its scope. Exploration and aggressive conquest continued, but the primary act of conquest had occurred.¹ To their Iberian conquerors, these were previously unknown and unimagined new lands and new societies. Even three

1. Leslie Bethell, *The Cambridge History of Latin America*, vol. 2 (Cambridge: Cambridge University Press, 1984).

earlier decades of experience in the Caribbean islands had not prepared them for the vast new territories acquired on the mainland.

State power and control found expression in the annual fleets of galleons that sailed virtually every year for three hundred years between Old World and New. The regularity of the *carrera de Indias* (annual fleets) is a measure of the determination of the early modern Spanish state and its rulers to hold fast to the glory and the profits of its New World empire. Had the voyages of these wooden sailing vessels faltered, the environmental effects of Spanish conquest and settlement in the New World might well have been considerably different. The annual transatlantic crossings formed a crucial link in the biological transfers characteristic of the early modern world.

Spain's Atlantic Coast ports were closer to the New World than any other European outlets. Andalusian Seville, even though located a hundred kilometers inland on the river Guadalquivir, became the primary port for the *carrera*. From the Gulf of Cadiz, prevailing northerly winds eased the departure of the fleet, often as many as forty or more vessels, for the Canary Islands. From this way station, the ships made use of the northeasterly trade winds to travel to Martinique, Dominica, or Guadeloupe in the Antilles for a stopover to load water and supplies. The next leg took ships to Havana and Veracruz. If all went well, the actual outward voyage could be as short as ten days to the Canaries, forty days to landfall in the West Indies, and another ten days to reach the mainland. Two months, however, was optimal, and most travelers reconciled themselves to six months or more in transit. On the return voyage, the fleets gathered at Havana, caught the Gulf Stream, and sailed north to reach the westerly trade winds for the passage across to the Azores.

By 1550, the square-rigged galleon of 400 to 600 or more tons capacity had become the preferred vessel for the *carrera*. If well maintained, each galleon could make as many as twenty Atlantic crossings. About a third of these vessels were constructed in northern Spanish shipyards, about a third in Dutch shipyards, and the remainder at Pacific and Atlantic Coast facilities in the Indies.

Considering the limited carrying capacity of even the largest galleons, the cumulative numbers of Spanish migrants is impressive. Perhaps 250,000 Spaniards traveled to the New World in the 1500s, and another 450,000 made the journey in the 1600s.² But the numbers dropped off sharply to about 50,000 in the 1700s, for a three-hundred-year total of 800,000 migrants.³ Royal officials began early to regulate migration. Passage to the Indies re-

quired official permission, which foreigners—Jews, Moors, and others—could not obtain. Most migrants were male, but the number of women migrants gradually rose to constitute one-fifth or more of the total in the sixteenth century; however, far fewer women than men migrated. Most migrants were young adults capable of work and procreation, not the very young or older populations. Officials, soldiers, missionaries, technicians, merchants, servants, and other Spaniards brought skills, values, biases, and hopes with them on the outward-bound journey. In the 1570s, migration and natural increase had brought the total Spanish population in the Indies to 150,000. Fifty years later, by 1620, this had tripled to 450,000 persons.⁴ This recurring source of human energy fueled the Spanish colonization of the New World.

Each Atlantic crossing was a conduit for the discourse of power, ideology, and money between center and periphery, between metropolises and colony. From the Council of the Indies (founded in 1523) came voluminous written royal orders, patents of office, and letters. New cadres of officials filled vacant and newly created posts in the colonial state. Commanders, troops, weapons, and supplies of war sent on the ships of the *carrera* stiffened a continuing process of domination and pacification. The return flow of reports, petitions, accounts, and other documents provided vital data for the council and the king.

The *carrera* was also the arm of a mercantilist monopoly of trade managed by the Casa de la Contratación in Seville. The royal trading house organized the voyages, passengers, and cargo bound for the Indies. All American trade was channeled through Seville and monopolized by a guild of royally approved merchants. Grains, wine, olive oil, furniture, cloth, dishes, paintings, and other consumer objects met the need for replication of the home society and culture in the Indies. Each westward crossing brought with it the demands of the state for exotica (strange birds, animals, plants, people, artifacts, and stories), for coined and uncoined precious metals, for hides and sugar, and for any other commodities that could defray the expenses of empire and return a profit to the state.

Each ship sailing from Seville conveyed a varied biological cargo. Domesticated animals, vermin such as rats and insects, and useful cultivars and unwanted weeds made the trip. Likewise, new microorganisms, mostly harmful, traveled with people, animals, and insects as hosts. The sunlight, salt air, and enforced quarantine of a lengthy sea voyage hindered successful passage of some of the most potent germs but, in the end, did not prevent their transmission. On the return voyage, galleons setting sail from Havana or Acapulco carried with them a similar biological manifest of flora and fauna. Many of the most valuable cultivars planted in Eurasia today are New World

2. Murdo J. Macleod, "Spain and America: The Atlantic Trade, 1492-1720," in *The Cambridge History of Latin America*, edited by Leslie Bethell (Cambridge: Cambridge University Press, 1984), 4:356-57.

3. An estimate of only 53,000 for the eighteenth century is given in Nicholas Sanchez-Albornoz, "The Population of Colonial Spanish America," in *The Cambridge History of Latin America*, edited by Leslie Bethell (Cambridge: Cambridge University Press, 1984), 2:31.

4. *Ibid.*, 1:18.

plants such as maize and potatoes, which crossed the Atlantic in sixteenth-century galleons. The cord of the annual fleet tied the ecological worlds of Eurasia and the Americas with an unbreakable strand.

POPULATION AND DISEASE

The Columbian connection had a devastating effect on the indigenous human societies of the Americas. Although most scholars today concede methodological problems in reconstructing close population numbers with any certainty, they agree that the precontact New World populations were of much greater size than the estimated population of 6.5 million persons on the Iberian Peninsula in 1500, and were closer to the 81 million estimated total European population of that date.⁵ The most systematic, region-by-region scholarly synthesis, compiled by William Denevan in the mid-1970s and revised in 1992, postulates a total New World population of 54 million (or a range of between 43 and 65 million, with a 20 percent margin of error) in 1492.⁶ Continuing debate, examination of sources, and new perspectives suggest that these numbers are in the right order of magnitude.⁷ The most populous regions included that of the Aztec civilization of central Mexico, with 14 million (± 2.8 million), and of the Inca civilization of the central Andes, with 11.7 million (± 2.3 million)—each double the size of Spain and Portugal put together.⁸ More than four-fifths of these peoples became subjects of the Spanish king; the remainder fell under Portuguese rule in Brazil.⁹

There is growing agreement among scholars that, by the early seventeenth century, after a century of Spanish and Portuguese rule, the New

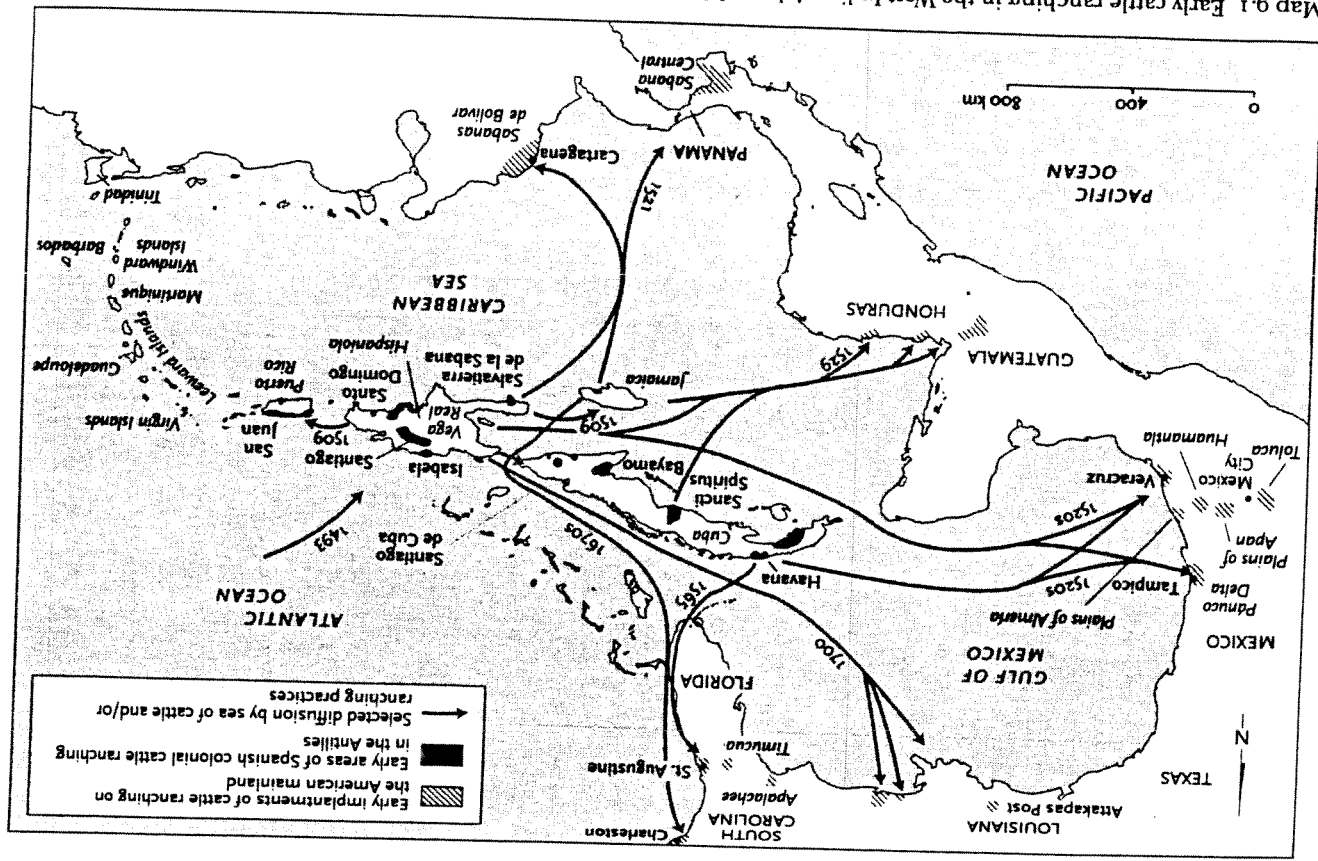
5. Colin McEvedy and Richard Jones, *Atlas of World Population History* (London: A. Lane, 1978), 18.

6. William M. Denevan, *The Native Population of the Americas in 1492*, 2d ed. (Madison: University of Wisconsin Press, 1992), xxviii–xxix, table 1. Denevan's single-number estimate is 53.9 million. See also W. George Lovell, "Heavy Shadows and Dark Night": Disease and Depopulation in Colonial Spanish America," *Annals of the Association of American Geographers* 82 (1992): 438.

7. David Henige, "On the Contact Population of Hispaniola: History as Higher Mathematics," *Hispanic American Historical Review* 58 (1978). In this book, Henige continues his assault on what he calls the "High Counters" who concoct high population figures for Central Mexico and the Andes with little justification. His writings have forced greater methodological clarity and admission of uncertainty on all concerned. My own view is that the Denevan figures are reasonable extrapolations based on several decades of research and controversy. His margins of error may well be too low, but overall, the populations of the New World were close to that of early modern Europe.

8. Denevan, *The Native Population of the Americas in 1492*, xxi–xxii, xxiv–xxv.

9. Denevan's revised figure for North America, including Florida and California, which came under Spanish control, is only 3.79 million. He estimates 5.66 million for Amazonia and 1.05 million for southern Brazil and Paraguay. *Ibid.*, xxviii.



Map 9.1 Early cattle ranching in the West Indies. Adapted from Terry G. Jordan, *North American Cattle-Ranching Frontiers: Origins, Diffusion, and Differentiation* (Albuquerque: University of New Mexico Press, 1993), fig. 17, p. 66.

World Indian population had declined to 5 or 6 million. This was about one-tenth its estimated precontact size.¹⁰ The Indian population stayed at this nadir during the seventeenth century. Only slowly over the course of the eighteenth century did gradual recovery occur, as survivors developed immunity to the new diseases. A growing mixed-race Spanish and Indian population, of course, complicates the picture. The continued migration of European whites and African blacks also swelled the numbers. After three centuries of Iberian rule, by the early 1800s, the total human numbers in the Americas had been restored to probably less than half the precontact number. By that date, Spanish America had a heterogeneous white, mestizo, black, and Indian population of approximately 13.5 million.¹¹ If we add to this the 4.4 million population of Portuguese Brazil in the early nineteenth century, the total was 17.9 million for the entire area under Iberian political control—colonial Mexico, the Caribbean, and South America.

Why this holocaust in such a relatively short time? New disease vectors suddenly introduced into the vulnerable populations of the New World began a sequence of horrific pandemics.¹² Rapidly spreading infectious disease devastated the indigenous peoples of the New World. It thinned their numbers, destroyed their institutions, and broke their resistance to Spanish aggression.¹³ Certainly, well-documented Spanish brutality and maltreatment of successive American populations killed many Indians outright and contributed to lowered resistance to disease, but only repeated scourging by multiple waves of pandemic disease can explain this rapid falloff.

The sudden onset of diseases like smallpox that were outside the experience of any Indian group induced terror, avoidance, and even abandonment of the sick. Flight meant that all normal daily routines and work ended. Crops were not tended. The sick were not buried. The survivors experienced

10. Lowell, "Heavy Shadows and Dark Night," 438; Denevan, *The Native Population of the Americas in 1492*, xxix.

11. Sanchez-Albornoz, "The Population of Colonial Spanish America," 2:33-35. For colonial Brazil, the same long-term trend can be found, with an early-nineteenth-century total estimated to be 4.4 million persons. The white population was about 1.3 million; the black, 1.1 million. About 800,000 tribal Indians lived in the interior, and the remainder were assimilated Indians and mestizos. Maria Luiza Marcilio, "The Population of Colonial Brazil," in *The Cambridge History of Latin America*, vol. 2, edited by Leslie Bethell (Cambridge: Cambridge University Press, 1984).

12. The peoples of the Philippines, who possessed large numbers of livestock and had considerable contact with Eurasia, did not succumb to heavy disease mortality after Spanish conquest.

13. David E. Stannard illustrates just how a combination of heavy disease mortality and inhibited fertility could have reduced these populations by looking at the well-documented case of Hawaii in the nineteenth century, "Disease and Infertility: A New Look at the Demographic Collapse of Native Populations in the Wake of Western Contact," *Journal of American Studies* 24, no. 3 (1990): 510-28.

malnutrition, even starvation, when they returned. Demographic recovery after major pandemics was hindered by reduced fertility, stillbirths, and other physical effects, as well as by cultural depression, hopelessness, and malaise resulting from Spanish colonial domination.

The Spanish certainly did not set out to kill off New World populations by bringing new diseases. It is doubtful that this great tragedy worked to the long-term advantage of the Spanish. Surely, if given the choice, they would have opted for the survival of a large, docile subject population that could offer labor and goods as colonial tribute to their new masters. They had little or no understanding of the catastrophic forces they unwittingly carried across the Atlantic. Even had they understood the connection, there was little, if anything, they could do to end or even mitigate the suffering and death caused by these diseases. The Caribbean had become part of the Eurasian reservoir of infectious animal and human diseases not by human design but by the operation of biological processes.

THE WEST INDIES

The West Indies, which Columbus reached in 1492, forms a chain of islands stretching south from the mainland into the Caribbean Sea: the Greater Antilles, including Cuba, Puerto Rico, Hispaniola, and Jamaica; the Bahamas; and the clusters of smaller islands in the Lesser Antilles. These are tropical lands whose warm, humid climate is dominated by the sea. Steady northeastern trade winds blow across the islands year-round, punctuated only by occasional storms or hurricanes. In the late fifteenth century, the islands were luxuriant with vegetation. On the windward side of each island were thick canopies of double- and triple-story, true tropical rain forest. Lianas and epiphytes abounded. On the exposed sides, less verdant forests shaded off to scrub, bush, and grasslands. An impressive variety of tropical trees and other plants, reptiles, birds, and fish flourished. There were, however, no large herbivores and no large predators on any of the islands.¹⁴

In 1492, the West Indies supported a dense human population estimated by Denevan to be 3 million persons.¹⁵ The indigenes were divided into more

14. David Watts, *The West Indies: Patterns of Development, Culture, and Environmental Change since 1492* (Cambridge: Cambridge University Press, 1987); for reproduction and translation of the most important original sources, see Robert G. Keith and J. H. Parry, *New Iberian World: A Documentary History of the Discovery and Settlement of Latin America to the Early Seventeenth Century*, 1st ed. (New York: Times Books, Hector and Rose, 1984), esp. vols. 1 and 2.

15. Denevan, *The Native Population of the Americas in 1492*. Denevan's estimate of 3 million persons for the West Indies includes a 20 percent margin of error (giving a range of 2.4 to 3.6 million). Denevan suggests a total population for the New World of 53.9 million in 1492, a range of 43-65 million (970). But as David Henige has pointed out, population estimates for the West Indies at the time of contact, as for the New World in general, cannot be substantiated and re-

numerous Tainos (Arawak), a smaller population of Guana-Hatabey hunter-gatherers in western Cuba, and Island Caribs in the Lesser Antilles, from Guadeloupe south.¹⁶ Scholarly estimates of the 1492 population for Hispaniola alone—an island approximately the size of Portugal—are much contested. On the low end, scholars suggest the Taino population of Hispaniola at that time was 100,000 or even fewer persons. Most propose 500,000 to a million persons. High-end estimates range from 2 million to as much as 8 million.¹⁷ In the absence of any direct quantitative evidence, narrowing the range of these estimates is difficult. Early Spanish observations did agree that this was a densely populated island. A midrange figure of 500,000 persons (6.5 persons per square kilometer) is certainly plausible.¹⁸ Noble David Cook favors the figure 500,000, citing a guess made by Nikolaus Federmann, a German settler in Santo Domingo in the early 1530s: "Of five hundred thousand Indians or inhabitants of various nations and languages that existed on the island forty years ago, there remain fewer than twenty thousand living."¹⁹

From archeological evidence, it appears that the Tainos came to the Antilles from the mainland and settled there about the beginning of our present era. The Tainos, in common with the Island Caribs and the Guana-Hatabey peoples, were not literate, nor did they use metal or metal tools. They had no domesticated animals other than the dog. They consumed no alcohol or other narcotics, save tobacco, which they smoked as cigars. They had no currency or money for exchange, although some trade occurred. They had no sailing vessels, but they could skillfully traverse sea passages between islands in their paddle-driven dugout canoes. They had no centralized state or administration of governance beyond loosely organized chieftaincies.²⁰

main informed guesses only (*Numbers from Nowhere*). In the late fifteenth century, the total population of the Iberian Peninsula was only about 7 to 8 million. Henige, "On the Contact Population of Hispaniola."

16. Irving Rouse, *The Tainos: Rise and Decline of the People Who Greeted Columbus* (New Haven: Yale University Press, 1992), 8–9, fig. 2. Rouse divides the Tainos into Western and Classic, who lived on Hispaniola, and Eastern Tainos, who lived on the Virgin and Leeward Islands. For Taino religious beliefs, see Ramón Pané and José Juan Arrom, *An Account of the Antiquities of the Indians: Chronicles of the New World Encounter* (Durham: Duke University Press, 1999).

17. Noble David Cook, *Born to Die: Disease and New World Conquest, 1492–1650* (Cambridge: Cambridge University Press, 1998), 23, table 1.1.

18. Hispaniola is 77,200 square kilometers in area. In his 1993 essay, Cook cites Frank Moya Pons's 1987 argument that a digging-stick horticulture supplemented with hunting and gathering could not support more than 20 to 30 persons per square kilometer. Moya Pons, *Después de Colón: Trabajo, sociedad y política en la economía del oro* (Madrid: Alianza, 1987), 184. Moya Pons himself arrived at an estimate of approximately 380,000, or 4.9 persons per square kilometer. Noble David Cook, "Disease and the Depopulation of Hispaniola, 1492–1518," *Colonial Latin American Review* 2 (1993): 213–46.

19. Cook, *Born to Die*, 22.

20. Watts, *The West Indies*, 5–25, 53–69. I use the term *Tainos* in preference to *Arawaks*, following Rouse.

In spite of these deficiencies—or perhaps because of them—the Tainos seem to have evolved an attractive lifestyle. They readily met their basic needs for food, shelter, and clothing. Famines, epidemics, and war were rare. Although Tainos were divided into a more privileged noble class and a majority of commoners, the harsh class distinctions typical of late medieval Europe were not in evidence. Commoners enjoyed personal dignity and freedom from arbitrary violence. The Spanish did not find any perceptible group of slaves or degraded persons in the society.

A chief, or *cacique*, who ruled each village could be either male or female. The *cacique* occupied the largest house facing the irregularly shaped plaza or village open space. Tainos lived in nucleated villages of up to two thousand persons in large, multifamily, dirt-floored structures made of timber and thatch. Baskets hung from the walls to store possessions; hammocks made of cordage were hung at night for sleeping. Groups of villages formed districts presided over by one of the village chiefs. Districts were grouped to form regions headed by the most notable district chief. In the late 1400s, there were five such regional chiefs discernible on Hispaniola. Conflict and violence was minimal. When armed clashes occurred, adult males were organized in bands under chiefs, but there was no distinct warrior caste. The primary threat came from aggression by the Caribs of the Lesser Antilles, who were active raiders.

Tainos grew cotton and wove it to make what little clothing, spreads, and other cloth was customary in this tropical climate. Taino adults were skilled carvers in stone, wood, shell, and bone; they were proficient potters. However, these skills were distributed widely rather than confined to a group of occupational specialists or artisans.

Land was held in common by members of each village. Surrounding each village were cultivated plots of land in which the Tainos grew manioc and sweet potatoes. This was horticulture (*conuco*) using digging sticks and hoes—not plows with draft animals. In this type of *conuco* horticulture, the Tainos first cleared forest areas by ringbarking and felling trees that were burnt at the end of the dry season. Burning infused phosphorus, calcium, and magnesium into the soil and permitted annual use of the plot until, after fifteen or twenty years, the soil began to lose fertility. Abandoned *conuco* lands were left fallow for about thirty years before they were cleared, burnt, and reused. The Tainos used their hoes to heap mounds of earth 1 to 2 meters high and 1.5 meters in circumference in orderly rows. In each mound, they inserted cuttings of manioc and sweet potato and seeds of squash and beans. The mounds made weeding and harvesting easier, improved drainage, and permitted longer-term storage of the tubers in the ground.

The *conuco* system provided phenomenal caloric returns. As the Spanish observer Friar Las Casas commented, "Twenty persons working six hours a day for one month will make a planting of such *conucos* that will provide

bread for 300 people for two years."²¹ Techniques for removing toxic cyanic acid from the bitter manioc permitted women to make unleavened bread and a food called cassava (cassava was later transmitted to Africa as a New World exchange product). Taino cultivators also grew maize, peanuts, calabashes, pepper, fruits, cotton, and tobacco in small garden plots.

Protein in the diet came from several sources. Taino men captured and penned green sea turtles (*Chelonia mydas*), large air-breathing marine herbivores, until they were to be slaughtered for their meat. They speared manatees in the rivers and captured tree-climbing iguanas (*Iguana delicatissima*) for their meat. They pursued and ate hutias (*Plagiodontia* sp.), sizeable, furry indigenous rodents. They employed lines and hooks, nets, and poison to catch fresh- and saltwater fish.

The Tainos fed themselves well year-round by a combination of horticulture and hunting and gathering. Their resource base on the larger islands may have been sustainable even with a dense population. Multiple crop horticulture under the *conuco* system preserved soil fertility. Turtles, fish, and other prey were still abundant at the time of contact.

These people evidenced no vitamin deficiency diseases. Infectious diseases were few, and there seem to have been no viral diseases. They were subject to tuberculosis, leishmaniasis, amoebic dysentery, rickettsias, and three forms of treponematoses—yaws, pinta, and syphilis. Without large domestic animals as carriers, there apparently were no zoonoses of the type that infected Eurasian populations.²² The general population was remarkably healthy by early modern European standards. Women bore three to five children, who seemed to live long lives. The overall condition of the Tainos and other Indian groups in the Caribbean strikingly contrasts with that of the ill-nourished, sickly ordinary folk of early modern Europe.

COLUMBIAN RULE IN HISPANIAOLA

After much effort, Columbus obtained a royal patent and financing from Isabella and Ferdinand of Spain that authorized him to explore, discover, and claim for Spain any previously unknown (to Europeans) lands and islands surrounding the Atlantic. His three-ship fleet sailed from the southernmost of the Canary Islands on September 8, 1492, picked up the prevailing winds and made landfall in the Bahamas thirty-three days later, on October 12.

Columbus quickly determined from his first contacts with the natives of the West Indies that they were not the Asian peoples he had sought. Moreover, the indigenous peoples he encountered were not a military threat,

since they lacked even iron and steel weapons and were not warlike. Instead, these inhabitants of the Indies were hospitable, had readily given him food, and hence were likely to be willing servitors of Spain. Not only that, they wore beaten gold ornaments and had knowledge of active placer mining for gold.

After visiting several islands, including Cuba, Columbus landed on the northern coast of Hispaniola and established a small encampment at a place called Navidad. Columbus and his men began actively negotiating with the Indians for gold objects they possessed and for knowledge of the sources of that gold. One of his captains discovered gold placer mines 145 kilometers to the east in the hills named Cordillera Central by the Spanish. When, after several months, Columbus decided to return to Spain, thirty-nine Spaniards volunteered to remain behind at Navidad. In January 1493, Columbus loaded an exotic cargo of gold nuggets, several enslaved Taino men, women, and children; and some Taino crops, including maize, aboard his reprovisioned ships and set sail for home. On March 15, he made port in Spain.

Within six months, Columbus set out from Cadiz with seventeen ships and fifteen hundred male colonists: a mixed group of *fidalgos*, or aristocrats; soldiers; artisans; and a few priests. With them, they brought wheat, chickpea, and other seeds; fruit trees; grapevines; and sheep, goats, swine, and cattle. The fully armed colonists also brought the horses and dogs of war.²³ The royal orders commanded Columbus to establish a Spanish settlement, to convert the natives to Christianity, and to locate and mine gold. From Columbus down, all of the settlers feverishly anticipated riches from Taino gold. The Spanish monarchs urged Columbus to develop items of trade for export to Spain in order to develop the island's economy. Other than gold, the two most likely items were brazilwood trees, whose cores contained a valuable dye, and enslaved Tainos for sale in Spain.

Ferdinand and Isabella made one other portentous concession to Columbus. They completely ignored the existing structure of property rights under which the Tainos lived and cultivated in Hispaniola. These were to be abrogated. Regardless of previous ownership or occupancy, Columbus was authorized to grant or sell individual property rights in land to the colonists in Hispaniola under the terms of the *repartimiento* system. These rights could be secured by living on and cultivating the land for at least four years or by building a house, gristmill, or sugar mill on it. These were the principles applied to the redistribution of land after the reconquest of Granada. Lands not distributed under this system would become part of the royal domain. Any tracts with brazilwood or valuable mineral resources were to be retained under Crown ownership.

When he reached Navidad in November 1493, Columbus found that no

21. Quoted in *ibid.*, 60.

22. Francisco Guerra, "The Earliest American Epidemic: The Influenza of 1493," *Social Science History* 12, no. 3 (1988); Cook, *Born to Die*, 17.

23. John Griener Varner and Jeannette Johnson Varner, *Dogs of the Conquest*, 1st ed. (Norman: University of Oklahoma Press, 1989); Cunningham, "The Biological Impacts of 1492."

Spaniards left behind had survived. They were dead either from fighting among themselves, exposure to syphilis (endemic and mild among the Tainos), or clashes with Tainos of the interior. Columbus moved his headquarters from Navidad up the coast to Isabella, much closer to the known placer gravels of the Cordillera.

Spanish brutality was much in evidence. All the Spaniards on Hispaniola suffered from paranoia. They continually suspected the Tainos of conspiring to surprise and, with their superior number, kill them. To a man, they were convinced that they must create awe and fear among the Tainos or they would be overcome. For this purpose, the dramatic punishments of late medieval Europe would have to be applied at any sign of defiance, betrayal, or disrespect. True exchanges for the gifts of food, which the Tainos showered on them, did not occur. Instead, when clothing "thefts" occurred, Columbus and his men publicly cut off the noses and ears of the suspected culprits. And they followed this by public decapitation of the *cacique* who tried to intervene.

Armed clashes followed, and several Spanish were killed by the angered Tainos in a surprise reprisal. Columbus hastened construction of a central fortification located in the center of the island and a network of intermediate forts. From this secure base, he sent out punitive expeditions against the nearest *caciques*. The Tainos could not offer effective resistance. As Las Casas commented, "How can a people who go about naked, have no weapons other than a bow and arrow and a kind of wooden lance, and no fortifications besides straw huts, attack or defend themselves against a people armed with steel weapons and firearms, horses, and lances who in two hours could pierce thousands and rip open as many bellies as they wished?"²⁴

In 1495, Columbus decreed that all Tainos between the ages of fourteen and seventeen living in the gold-producing districts then directly controlled by the Spaniards were to pay a regular tribute in gold at three-month intervals. In areas that produced no gold, Columbus demanded tributes of cotton and spices. Rather than comply, Tainos in these regions abandoned their villages and fled in large numbers. Those Tainos who remained in the villages but could not pay the tribute were enslaved and put to forced labor in the gold-mining areas or were shipped to Europe.

Urged on by royal demands for profit, the colonists put brutal pressure on the Tainos to exploit all known sources of gold far more than had ever been the custom and to search relentlessly for new mines. Bands of armed Spaniards roamed central Hispaniola interrogating Tainos and looking for gold veins or placers. When new sources of gold were discovered, the Spanish compelled the Tainos to work them under horrendous conditions. At the same time, the Spanish demanded foodstuffs for themselves from the Tainos, who were forced to produce a surplus to meet the hearty appetites of their

24. Quoted in Watts, *The West Indies*, 78.

conquerors. This was an especially onerous burden, since *conuco* cultivation seems to have been nicely calibrated to produce sufficient food for each village but not a large surplus for export beyond the village. Spanish demands for food pushed the system to its limits.

These gold-seeking expeditions also were occasions for slave taking. Captive Taino men, women, and children were regularly shipped to Europe, which became one way to satisfy continuing royal demands that the new colony show a profit on the Crown's investment. Columbus aimed at sending four thousand captives a year to Europe to be sold to landowners in Iberia.

Deserted *conucos* rapidly grew weeds and secondary vegetation. Food shortages developed and led to famine conditions in the central part of the island. Mortality among the Tainos soared. Indices of cultural depression, such as increased suicide and decreased fertility, became manifest. It is very likely that the Tainos suffered from influenza compounded by malnutrition. In that year, Columbus added cassava to the list of acceptable tribute items to make up for food shortages among the colonists.

A rebellious dissident faction of settlers under Francisco Roldan, the mayor of Isabella (no longer the capital since the move to Santo Domingo on the south coast), forced an accommodation on Columbus that resulted in a significant shift in colonial policy. Roldan insisted on amending the allocations of land to Spanish settlers made under the *repartimiento* rules for distributing conquered territory. In addition to land rights, settlers should obtain property rights over Taino chieftains and their people located within or adjacent to their grants. The Tainos were to serve each grant holder by planting *conucos*, laboring in the mines, or providing personal service. This addition, which came to be known as the *encomienda*, became the basic means of inflicting servitude on Indians throughout Hispanic North and South America.

Between 1492 and 1542, just half a century, the Tainos on Hispaniola became nearly extinct. Scholars generally agree on the early-sixteenth-century numbers and their trend. The Taino population was estimated to be about 60,000 persons in 1508. In 1510, Diego Columbus counted 33,523 Tainos. Four years later, in 1514, the figure had dropped to 26,334. By 1518-1519, the Tainos had dwindled to 18,000 persons when the first smallpox epidemic hit.²⁵ Mortality from smallpox, added to other causes of death, brought the Hispaniolan Tainos to near extinction: there were about 2,000 persons in 1542. If the 1492 population had been around a half million persons, reduction to 18,000 in twenty-six years was a catastrophic decline.

Before the first well-documented onset of European-transmitted smallpox in 1518, there is little direct evidence of widespread Taino death from newly

25. Cook, *Born to Die*, 23-24; Cook, "Disease and the Depopulation of Hispaniola," 216.

transmitted European infectious diseases. Spanish violence and brutality caused deaths from malnutrition, overwork, injury, and cultural despair. Contemporary Spanish observers noted widespread sickness and mortality among the Spanish colonists but generally do not make similar observations about the Hispaniolans.

That twenty-six years could pass between Columbus's first voyage and the arrival of smallpox may seem strange. However, as Alfred W. Crosby points out, characteristics specific to the disease slowed its transmission across the Atlantic. Humans, not insects or animals, carry smallpox. This highly communicable virus is transmitted from person to person by secretions of the nose and throat and by secretions from its characteristic pustules. The disease runs its course—from incubation to high fever and vomiting, to skin eruptions, and to death or recovery—in less than a month. Any voyager infected with smallpox would be dead or recovered well before the ship arrived in the New World. Recovered smallpox victims were immune to recurrence and could not spread the disease when their pustules dried up. Heat and sunlight onboard ship tended to kill off the virus. Almost all voyagers were adults who probably had had smallpox earlier and were largely immune. The disease could be carried across only if several persons without immunity were on the same vessel, or if smallpox scabs in which the virus remained live were somehow carried in the bedding or clothes of a victim.²⁶ Therefore, the virus could be delayed, but would almost invariably arrive.

Some historians have argued inferentially that the Spanish colonists brought disease to the West Indies before 1518. Transmittal of other diseases, such as typhus carried by fleas, is not subject to the same barriers as smallpox. They posit that a mixture of new diseases may have killed many Indians in the first quarter century of contact. In the mid-1680s, a medical historian, Francisco Guerra, extrapolating from present-day epidemiological knowledge, argued that Columbus's ships on the second voyage carried an unseen lethal cargo.²⁷ The Spaniards were infected with a virulent strain of influenza from contact with pigs carrying swine fever virus. The probable suspects were eight sows taken aboard the fleet at the Canary Islands in early October 1493. Columbus himself fell sick December 10, 1493, one day after the illness manifested itself at Isabella, but he recovered. Mortality among the Spanish from disease with flulike symptoms was

²⁶ Alfred W. Crosby, "Conquistador y Pestilencia: The First New World Pandemic and the Fall of the Great Indian Empires," *Hispanic American Historical Review* 47, no. 3 (1967): 326-27.

²⁷ Guerra, "The Earliest American Epidemic"; Francisco Guerra, "The European-American Exchange," *History and Philosophy of the Life Sciences* 15, no. 3 (1993); and, following Guerra, Lovell, "Heavy Shadows and Dark Night." Guerra first advanced this thesis in the mid-1980s in Spanish publications; see Francisco Guerra, "La epidemia americana de influenza en 1493," *Revista de Indias* 45 (1985): 325-47; and Guerra, "El efecto demográfico de las epidemias tras el descubrimiento de America," *Revista de Indias* 46 (1986): 41-58.

heavy. Guerra argues that swine flu was acutely contagious, spread readily to the Taino population, and traveled with the Spanish as they voyaged to other islands.

Cook, while resisting Guerra's specific identification of influenza, has suggested that an assortment of diseases, possibly including typhus—all rampant in Spain at the time—undoubtedly assailed the Tainos just as the diseases infected the Spanish colonists.²⁸ This is a reasonable inference, but Cook can find only two direct statements about widespread disease among the Tainos to support his argument. That the Tainos were increasingly vulnerable to infection because of depression, stress, and maltreatment seems likely. That they were therefore susceptible to the infectious diseases brought by the Europeans is also likely. Human society in the West Indies now shared the Old World reservoir of infectious human and animal diseases.

SLAVES AND GOLD

Settler dissatisfaction, inadequate profits, and general bad management brought removal of Columbus and his family in disgrace in 1500. At Seville, the Crown formed a new ministry for administration of the Indies. This body sent out a royal judge as temporary governor, who administered the island until 1502. In that year, Frey Nicolas de Ovando arrived to begin a seven-year term as the royal governor of Hispaniola. With him came twenty-five hundred more Spanish settlers. This new influx included many skilled artisans, a number of priests, and, for the first time, a few Spanish women and children.

Contradictory, or at least ambivalent, royal orders to Ovando commanded him to encourage conversion of the Tainos to Christianity, to protect them from abuse, to punish those who harmed them, and to collect tribute from them based on the value of their lands. Simultaneously, he was to increase the revenues of the island. To do so, the new governor was permitted to force the Indians to labor in the gold mines, although they were not to be enslaved. They were to receive a just wage for their efforts. The new governor was to found new towns in which colonists and natives were segregated. The process of allocating land rights was to continue.

Ovando chose to stress revenues rather than the wellbeing of the Hispaniolans. Within two years, he had broken the power of the remaining *caciques* on the island to undercut any possible resistance to his policies. In a series of treacherous massacres and brutal battles, Ovando and his commanders killed hundreds of Taino chiefs and their families and effectively de-

²⁸ Cook, *Born to Die*, 230. According to Cook, "Each subsequent ship and fleet brought from southern Spain new settlers, animals, plants and obviously pathogenic. To argue that illness was not transported is to assume the highly improbable."

stroyed indigenous leadership on Hispaniola. New Tainos chosen by the Spanish governor were appointed as chiefs and forced to mobilize their people for labor in the mines or for cultivation of cassava according to *encomienda* rules. The governor next altered the rules for land grants and Indian service to permit the transfer of Indian work groups wherever labor was needed on the island. The new rules specified that such transfers could not keep Tainos away from their home villages and cultivation more than six to eight months a year. The remaining months were to be reserved for food production.

Gold production soared under the new regime, helped by discoveries of new ore-bearing veins in the Cordillera in 1499 during Columbus's governorship. By 1502, Hispaniola was shipping a ton or more of gold back to Spain every year.²⁹ News of the gold attracted a steady flow of settlers from Spain and raised colonial numbers to between eight thousand and ten thousand by 1509, at the end of Ovando's governorship. Partly as a result of forced labor in the mines, Taino mortality continued to the point that an official count in 1508 found only sixty thousand indigenes left alive. The colonists began to import small numbers of black slaves from West Africa and the Canary Islands to work in the goldfields.

Just before he left Santo Domingo, Ovando obtained royal permission to raid "useless" islands without gold deposits, such as the Bahamas and Lesser Antilles, and to seize their inhabitants for additional gold-mine labor on Hispaniola. He also was authorized to send out official expeditions to Puerto Rico, Cuba, and Jamaica to find gold. When his successor, Diego Columbus, son of the admiral, landed at Santo Domingo in 1509 and assumed the royal governorship, a policy of aggressive expansion was already under way, one that he accepted enthusiastically.

Under Columbus, regular raids on the Bahamas continued steadily for five years. One observer estimated that some forty thousand Bahamians had been seized and taken to work in the gold mines. Las Casas stated that many of these unfortunate captives did not survive the sea crossing because of overcrowding and brutality. He claimed that Spanish ships could navigate between Hispaniola and the Bahamas "without compass or chart, merely by following for the distance between the Lucayan [Bahamian] Islands and Espanola, which is sixty or seventy leagues, the traces of those Indian corpses floating in the sea, corpses that had been cast overboard by earlier ships."³⁰ By 1514, the Bahama Islands were depopulated and would remain in that state for a century or more.

29. Kirkpatrick Sale, *The Conquest of Paradise: Christopher Columbus and the Columbian Legacy* 1st ed. (New York: Knopf, distributed by Random House, 1990), 180-81.

30. Cited in Watts, *The West Indies*, 107.

Royal permits for slave raiding were quickly extended to include the islands of the Lesser Antilles as far as Curaçao, Aruba, Trinidad, and Tobago, off the Venezuelan coast. Even the ferocity of the Island Caribs did not spare them capture and transportation from their home islands. The Spaniards enslaved well over a hundred thousand Tainos and Caribs between 1509 and 1519. Remnant groups of Caribs retreated to the hilly interiors of their islands and resisted the slave raiders well enough to survive. Other islands, like Barbados, were completely stripped of their human populations.

In 1508, a small exploratory party under Juan Ponce de León landed in Puerto Rico and found gold placers in the less-populated western end of the island. A rush of Spanish miners from Hispaniola put the usual pressures on the Tainos of Puerto Rico. Within two years, the Tainos rebelled. They organized an uprising against the Spanish settlers in the west, which they coordinated with a raid on the eastern coast by Caribs from Saint Croix. Eighty Spanish settlers died in the attacks. Violent repression followed, in which great numbers of Tainos were worked to death in the gold mines, killed outright, or transported to Hispaniola, from which they did not return. As soon as the gold played out, the Spanish left a virtually depopulated island to feral swine and cattle.

Diego Columbus sent an expedition to occupy Jamaica in 1509. Active searching turned up little gold to be mined. Settlers obtained land grants with labor rights attached. In the absence of gold, the settlers forced the Tainos of Jamaica to work brutally hard to produce a surplus of manioc, cotton, and maize to export to Hispaniola and Cuba. As elsewhere, Spanish cattle, hogs, and horses were imported and allowed to graze freely without regard for protection of the *conuco* plots. Food scarcities, enslavement, and outright slaughter sharply reduced the Taino population on Jamaica. Within a decade, only isolated groups lived in retreat in the hills.

Cuba's turn came in 1511. An expedition under Diego Velasquez rapidly colonized the island. Within a year, the Spanish had established seven settlements, each located near a gold placer deposit adjacent to large Taino populations. Numerous Tainos from Cuba were enslaved and shipped out; the remainder were subject to the *encomienda* labor demands. Within seven or eight years, most of the Tainos were gone and replaced by herds of open-range livestock. Some survivors fleeing Spanish genocide found refuge in the Sierra Maestra.

On Hispaniola, the indigenous population plummeted under Diego Columbus's governorship. Most of the approximately eighteen thousand Tainos counted by a royal inspector in 1518 had been uprooted from their original homes by the forced labor system. At least a quarter were resident in Santo Domingo, and many were household servants of the Spanish settlers. With the death of Ferdinand and the accession of Charles V, a spirit of

reform prevailed and the Spanish Crown began to acknowledge atrocities committed against the Tainos.³¹ In 1518, a triumvirate of three Jeronymite missionaries replaced Diego Columbus as governor. These officials brought with them instructions to abolish forced labor, resettle the surviving Tainos in pueblos of four hundred to five hundred persons, and restore *conuco* horticulture for manioc.

Just as this program was going forward, the first smallpox cases arrived in Santo Domingo and spread rapidly through the susceptible Taino population of Hispaniola.³² Writing on January 10, 1519, the friars reported to Charles V, "It has pleased Our Lord to bestow a pestilence, of small pox among the said Indians [of Hispaniola], and that it does not cease. From it have died and continue to die to the present almost a third of the said Indians."³³ Scarcely without a pause, the contagion leapt to Puerto Rico and the remaining islands of the West Indies. Shortly thereafter, yellow fever and malaria, presumably carried by African slaves, afflicted the indigenes as well. These assaults reduced the indigenous population of the larger islands to a residue of some hundreds of survivors.

In the face of the Taino die-off, Spanish officials tried to stabilize the settler population of Hispaniola and to devise for the colony an economic base more viable than gold mining. An entirely masculine body of settlers with little or no permanent attachment to the island was scarcely desirable. Officials encouraged Spanish women to migrate and marry Taino women. In spite of that, tried to induce male colonists to formally marry Taino women. In spite of these measures, nearly two-thirds of the colonists remained unmarried fortune seekers who likely would not find wealth on Hispaniola. Well before the departure of Diego Columbus, the gold mines of Hispaniola showed signs of exhaustion. By 1519, they were almost entirely worked out, and no viable new sources of gold were to be found.

As food production by the Tainos precipitously declined, the settlers themselves began to grow their own manioc in *conuco* plots. Numerous imported garden vegetables (cabbages, cauliflower, onions, lettuces, garlic, and eggplant) were successfully grown, as were oranges, limes, lemons, and citron. Bananas, grown on trees imported from the Canary Islands, flourished. African slaves, who were permitted to grow their own food crops, introduced African plants: yams and cashews, as well as medicinal plants such as cassia (*Cassia fistula*) and the castor oil plant.³⁴

31. Patricia Seed, "'Are These Also Not Men?': The Indians' Humanity and Capacity for Spanish Civilisation," *Journal of Latin American Studies*, 25, no. 3 (1993).

32. Crosby, "Conquistador y Pestilencia."

33. Quoted in Cook, *Born to Die*, 60.

34. See Watts, *The West Indies*, 116, table 3.1.

SUGAR PLANTING

For some years, the Dominican friars had been arguing for the development of commercial agriculture on Hispaniola so that valuable crops could replace gold. Despite earlier failures to grow commercially viable crops, the Dominicans argued that cane sugar was the best candidate. Moreover, the demand for sugar at home was rising. Europeans who could afford it were becoming addicted to the several forms of refined sugar grown in limited supplies around the Mediterranean and on the newly occupied Atlantic islands. Sugar, like coffee, tea, and spices, had a high market price relative to its bulk. Once heated, concentrated, and packed in granular form, it remained edible without spoiling for long periods of time. If protected from water damage, it could be shipped cheaply over long distances by water transport. Sugar was replacing honey as the main sweetener in northwestern Europe. Crystallized cane sugar was becoming a basic foodstuff, a commodity rather than an oddity, medicine, or decoration. In England, apples, plums, apricots, and pears were newly popular tree crops. These fruits were combined with cane sugar to make a wide variety of jams and jellies.³⁵

Shoots from a hybrid variety (a combination of *Saccharum barberi* and *Saccharum officinarum*) long used in the Middle East, India, and Europe, traveled with Columbus on his second voyage from the Canary Islands to Hispaniola in 1493. Sugarcane flourished in the abundant water and heat of the West Indies. (Below an average annual temperature of 21°C, sugarcane's growth is severely reduced; between 11°C and 13°C, its seeds will not germinate. The outer margin for sugarcane lies in the subtropics, where risk of frost is minimal.)³⁶

New World Indian groups quickly determined that sugarcane was a much more powerful sweetener than anything they possessed in their dietary. Cane could be chewed, boiled in water to make a drink, and crushed with simple tools. Samples of cane passed readily from group to group on the mainland to the point that later European explorers assumed, erroneously, that the sugarcane grown by the Indians they encountered was native to the New World.³⁷

In 1515, Gonzales Velloso, a small landholder near Santo Domingo, encouraged by escalating sugar prices in Europe, obtained cane cuttings and imported an efficient sugar mill and technicians from the Canary Islands. Velloso succeeded in growing and processing sugarcane for export. Follow-

35. *Ibid.*, 177.

36. *Ibid.*, 14.

37. J. H. Galloway, *The Sugar Cane Industry: An Historical Geography from Its Origins to 1914* (Cambridge: Cambridge University Press, 1989), 61-63.

ing Vellosa's example, other Spanish landowners on the southern coast invested in sugar to develop a zone of production with *estancias* (ranches) located in the coastal river valleys in an area of perhaps one hundred kilometers along the coast west from Santo Domingo.³⁸

The estates were small, about one hundred hectares in size, of which half might be cultivated and the remainder left to woodlands. Planters devoted ten to twelve hectares to sugar, producing about 125 metric tons per year of brown, semirefined *muscavado* sugar. Lacking Indian labor, the proprietors imported black African slaves to work their holdings, with an average of two hundred slaves on each estate.³⁹ By the 1530s, there were thirty-four sugar mills operating on the island.

Sugarcane grew more or less continuously on plantation fields. The first planting of sugarcane took from twelve to eighteen months to reach harvest size. Subsequent crops from the same planting required less time, but still about twelve months. To maximize their investment in the crushing mill, animals, and slaves, the early Hispaniolan planters learned to stagger plantings of individual fields so that the crop would not ripen all at once. Instead, harvesting in some regions continued for as long as ten months of the cultivation year. After one crop was cut, several more crops regrew from the same stems and root systems before sugar yields declined.

Sugarcane has a long, cylindrical stalk, or stem, with narrow leaves attached. The thick green, yellow, or brownish red cane stems vary in diameter from two to five centimeters and grow to a height of four meters or even more. In cross section, each stem is crudely cylindrical. The stem has a rind enclosing and protecting a fleshy pith, where the sugar is stored. To get access to the sugar in the cane pith, the rind must be chewed or crushed.

Sugarcane reproduces asexually. The stem divides into joints from ten to thirty centimeters in length. Each joint is marked by a node revealed as a band or ring encircling the stalk. Each node contains a bud and root primordia. When severed and planted in soil, the node generates a new plant. One planting of seed cuttings or nodes gives several successive crops of cane. According to J. H. Galloway:

After the harvest of the first crop, known as the plant cane, the roots and lower part of the stem remain in the ground. The short section of the stem which is left below the surface of the soil has its full complement of nodes, buds, and root primordia from which [to] develop new plants while the old root system rapidly decomposes providing nourishment for the new. Each of the crops suc-

38. Mervyn Ratekin, "The Early Sugar Industry in Espanola," *Hispanic American Historical Review* 34 (1954): 1-19. Also Huguetta Chaunu, Pierre Chaunu, and Guy Arbellot, *Séville et l'Atlantique, 1504-1650* (Paris: A. Colin, 1955), 8:521-28.

39. Watts, *The West Indies*, 125.

ceeding the plant cane is a "ratoon" crop—the first ratoon, second ratoon, and so forth, the ultimate number depending on such factors as the local environmental conditions, the variety of cane, the yield of sugar, and the incidence of types of pests. The yield of sugar from ratoon crops usually is less than that from the plant cane and gradually declines until the ratoons are no longer profitable.⁴⁰

When planting the first crop, slaves buried cane stems in rows in shallow furrows. They culled poor cane shoots at one month, followed by intensive weeding and attempts to kill off rats and other vermin. At harvesttime, slaves cut the stems about twelve to thirteen centimeters from the ground and left the plant in the field for ratooning. As soon as the cane was cut, it had to be crushed immediately to prevent fermentation. Thereafter, the juice was heated, filtered, and cooled to finally crystallize in loaves in a fixed sequence.

For the remainder of the century, Hispaniolan planters exported sugar to Seville regularly, until maritime traffic into Santo Domingo and other colonial markets fell off sharply in the 1590s. Spanish sugar growing on Hispaniola and other islands of the West Indies in the Caribbean failed to flourish or to compete with Brazilian sugar in the international markets. Limited shipments of sugar went primarily to colonial markets in the New World. Between 1568 and 1595, Hispaniolan planters shipped an average of 348 metric tons of sugar per year to Seville.⁴¹ Santo Domingo was by far the largest exporter of sugar to Spain in the sixteenth century, as compared to Puerto Rico and Cuba.

CATTLE RANCHING

Other than sugar, the brightest prospects seemed to lie in exploitation of the herds of wild cattle that flourished under open grazing. Invading European livestock had dramatically altered human interaction with nature in the New World. Grass and pasture previously ignored by humans became a valuable resource. Cattle and swine flourished immediately in the humid climate of these islands. A few released Spanish hogs, which found abundant browse and no enemies in the island forests, became feral and prolific in their new ecological niche.

The marshes and savannas of the four Greater Antilles islands—Hispan-

40. J. H. Galloway, *The Sugar Cane Industry*, 13.

41. Chaunu, Chaunu, and Arbellot record a total of 4,526 metric tons (303,602 arrobas) of sugar sent from Hispaniola to Seville for thirteen years for which data exist, between 1568 and 1595, or an average of 348 metric tons per year (30,277 arrobas) recorded. *Séville et l'Atlantique*, 8:1004, 1008.

iola, Jamaica, Cuba, and Puerto Rico—became a base where the cattle-raising culture of Iberia found a new expression. About three to four hundred red-dish brown or piebald Spanish longhorn cattle, or *criollos*, survived the voyage from the coastal cattle-breeding regions of Andalusia, or from the Canary Islands to the West Indies, between 1493 and 1512. These semiferal, uncastrated cattle came predominantly from Las Marismas, a marshy area of labor-extensive, open range commercial grazing on the coast of Andalusia. The immigrants reproduced at astonishingly rapid rates. The coastal marshes offered rich forage, as did the lowland grassland areas on each island. They had no grazing competitors, no menacing cattle diseases, and no predators in the early years. All the vast herds of *criollos* that later spread throughout Spanish colonial America were descended from this small band of migrants landed in the West Indies.⁴²

Commercial cattle raising in the West Indies developed as an estate system of individual properties owned by a handful of Spanish colonists in an extension of the *repartimiento* system first articulated under Columbus in 1493. For the owners of larger estates, cattle ranching became a profitable and enviable way of life. They formed an island elite that had the means to live in town as absentee owners for much of the year but had the prestige of aristocratic horsemen.

Early on, cattle ownership carried with it the acknowledged right to graze on Crown lands. Gradually, a system of formal usufructary royal pastoral land grants evolved. Often circular in shape, with a two-league radius, these were huge tracts encompassing an area of 22,500 hectares or more. Generally, these large pastoral grants conveyed property rights over the most desirable, usually flatter, marshes and savannas on each island. Not all potential pasture was given out by the Crown. Some grazing lands remained in the Crown domain, especially in the hillier areas, and could be freely used by any cattle owners. Smaller ranchers and even men without lands could count on access to the less desirable domain lands to raise cattle.

The Andalusian term *hato*, originally the name for a herding encampment, came to designate lands devoted to cattle ranching. Mounted vaqueros used the Andalusian lance (*garrocha*) and the uncast lasso to gather the nearly wild cattle from the open range once a year for branding and ear-marking in the dry season. Unlike in the Andalusian model, the cattle were not shifted seasonally but remained largely stationary. Since the primary product was the hide, they could be slaughtered right in the pasture if need be. The cowboys were black African slaves from West African cattle-herding societies, or free blacks brought from Andalusia, surviving Tainos, or even

42. Terry G. Jordan, *North American Cattle-Ranching Frontiers: Origins, Diffusion, and Diffraction* (Albuquerque: University of New Mexico Press, 1993), 67.

some young, unmarried Spanish settlers. A ranch boss employed by an absentee owner supervised them. On smaller ranches, the owner was resident and his male relatives, aided by a few slaves or servants, were the vaqueros.

This was entrepreneurial, profitable, large-scale commercial pastoralism. West Indian ranchers annually exported quantities of tanned hides (tanned with bark from the mangrove tree) to the Andalusian leather industry. At the period's height in the 1530s, Hispaniolan ranchers alone shipped 200,000 hides a year to Spain; by the latter half of the century, annual shipments had declined to just over a tenth of that figure.⁴³ In addition to land dedicated to cattle, the larger estates included ginger or sugar plantation areas; hog *corrales* in the forests; cassava, maize, and sweet potato fields; and vegetable gardens. Aside from hides, they exported sugar, ginger, dried meat, tallow, and lard to the Spanish mainland colonies. Island ranches sold thousands of live cattle as well to meet the demand for breeding herds on the mainland.

Beyond the reach of the rancher were numerous herds of completely feral cattle, horses, and pigs found in the hilly, forested areas of the islands. The wild cattle of the Antilles became the prey of market hunters who sold hides and tallow for export. Mounted on specially trained horses, these hide hunters pursued roaming cattle with packs of hunting dogs. They used a blade on the long Andalusian lance to thrust forward and cut the hamstring of the fleeing animals. Dismounting, they used a knife on a shorter pole to kill the animal, stripped the hide and tallow, and left most of the meat for the dogs to eat. At times, the same techniques were used in pursuit of wild pigs.

THE ENVIRONMENTAL IMPACT

In the islands of the West Indies, dense human populations gave way to vast numbers of invading exotic grazing and rooting animals and new predators. Cattle and hogs flourished; so did horses and goats, although more slowly. These large animals put new pressures on the landscape as they consumed and trampled vegetation. The introduction of horses, cattle, pigs, and goats compacted the soil and increased runoff and soil erosion. David Watts comments, "In Espanola, there is some documentary evidence that the massive erosional gully forms, termed *barrancas* and *arroyos*, which are now so widespread on mountain land, postdate the advent of European grazing animals; and indeed there is no reason why gullies should have developed, even on steep slopes, under the environmentally conservative *conuco* system of pre-

43. Chaunu, Chaunu, and Abbellio, *Séville et l'Atlantique*, 8:1012-13, table 708. Hides shipped from Hispaniola averaged 26,387 per year between 1581 and 1607 (an eight-year sample).

Hispanic times.⁴⁴ Feral dogs—the larger European breeds—and cats, a new import, found ready prey in the indigenous hutias and iguanas, as well as in feral Spanish livestock.⁴⁵

In the savannas, overgrazed by the introduced cattle, weeds replaced native grasses. No longer maintained by Tainos, the highly productive *conuco* system of land use virtually disappeared as abandoned plots reverted to fallow ground. Free-ranging pigs delighted in rooting up tubers from *conuco* mounds. As soon as weeding ended, a new vegetation cover of indigenous weeds and shrubs, including guava, acacias, shrub cottons, and later, palms, as well as introduced plants like various citrus species, quickly grew up.

By the beginning of the seventeenth century, the landscapes of Hispaniola and the other West Indies islands bore little resemblance to their pre-conquest state. The balanced *conuco* horticulture of the Tainos and Caribs no longer shaped the landscapes of the islands. Instead, Spanish ranchers and sugar planters were the land managers of the colonial regime. The hooves and teeth of the Spanish livestock allowed to roam in great numbers were the primary instruments of human impact on island ecosystems and vegetation.

CONCLUSION

When Columbus made landfall on an island in the Caribbean in 1492, this event established a new connection, a new conjuncture in world history. The newly created maritime connection between Old and New Worlds, between Eastern and Western Hemispheres, was of absolutely central importance for world environmental history. After 1492, interaction between humans and nature throughout the globe changed irrevocably. Post-Columbian regular maritime traffic from Europe supported a five-century process of expansion and control in the New World. Europeans restlessly explored new territory, conquered indigenous peoples, exploited newly discovered natural resources, settled colonies, cleared forests, expanded sedentary cultivation, and introduced new flora and fauna throughout the Western Hemisphere. With this new contact, biological exchanges began to occur on a global scale in a process that continues today.

The story of the earliest colonial venture in the New World—that of the Spanish on Hispaniola and the other West Indies islands—illustrates the immensity of the changes caused by the European invasion. Columbian discovery and colonial rule in the West Indies brought drastic changes to the

44. Watts, *The West Indies*, 119.

45. The Antilles hutia are divided into several families and species. The little-known Hispaniolan hutia has a long tail like the Cuban species and is apparently nocturnal.

people and natural environment of the Greater and Lesser Antilles. The environmental impact of Spanish colonial rule was more devastating in the Caribbean than in the remainder of the Americas. In many ways, this transformation reflects the vulnerability of island ecosystems to intrusive new species.

