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Every schoolchild knows that in 1492 Christopher Columbus, a Genoese seaman sailing under the flag of Spain, captained a fleet of three tiny ships and discovered a land unknown to the peoples of Europe. His was a remarkable feat despite his inability, even after three more trips to the Americas, to comprehend the true significance of his explorations. He was not alone in this lack of understanding, of course, for it took decades for the peoples of Europe to appreciate the extent of his accomplishments. No better example of this need be noted than the failure of European cartographers to call these newfound lands Columbia, in honor of Columbus. Instead, they named them for Amerigo Vespucci, a Florentine clerk with a yen for travel whose widely circulated letter *Mundus Novus*, written in 1503, publicized the discovery of the New World long before Columbus's journals were available to European readers.

Columbus did more than force the cartographers of Europe to revise their maps of the earth. His voyages of discovery were pivotal in world history. The Western Hemisphere was rapidly and profoundly transformed biologically and culturally by seeds of change—plants, animals, and diseases—that were introduced, sometimes deliberately, sometimes accidentally, by Columbus and those who followed him. Eventually the processes of encounter and exchange that Columbus initiated affected the Old World as well, altering flora and fauna, reordering the ethnic composition of countries, changing the diet and health of peoples everywhere. They continue to this day.

Columbus could not have sailed at a more opportune time. Affairs in Europe in 1492 were in disarray. At the head of the Catholic church, which dominated the political as well as religious life of much of Europe, was the corrupt pope Rodrigo Borgia. Bickering with the church as well as among themselves were the monarchs of England, France, Spain, and the Germanies. Peasants were crushed by a legacy of incessant warfare and excessive taxation. Intellectuals were drifting in a sea of restlessness and uncertainty, lacking the rudder of religious faith and royal authority that had characterized the Middle Ages but heeding the siren call of the Renaissance, which dared man to believe in himself, to create new art and question old gods, to seek knowledge based on facts instead of dogma.

The Renaissance was an unexpected legacy of the crusades, the failed attempt to wrest the Holy Land from its infidel occupants. Although the crusades had military and religious objectives, they produced marked and unexpected cultural, intellectual,

The voyages of Christopher Columbus initiated a continuing exchange of plants, animals, and peoples of two hemispheres. The result was a new world.

descendants of the original Indian inhabitants. Indeed, the native peoples had disappeared by 1600. Although no one knows what their numbers were in 1492, current estimates range from sixty thousand to as many as eight million. Columbus himself remarked that "the Indians of this island . . . are its riches, for it is they who dig and produce the bread and other food for the Christians and get the gold from the mines . . . and perform all the services and labor of men and of draft animals."

If Columbus believed the Indians were the island's riches, he did little to protect Spain's fortune. Bartolomé de las Casas, the Dominican friar and polemicist, whose father and uncle had come with Columbus to Hispaniola in 1493, believed that three million natives had perished after little more than a decade of contact with the Europeans—the result of disease, warfare, forced labor, and enslavement. "Who of those in future centuries will believe this? I myself who am writing this and saw it and know the most about it can hardly believe that such was possible."

When there were no longer sufficient Indians to maintain the New World plantations, Europeans turned to Africa for labor. The exact number of Africans kidnapped and sold into New World slavery will never be known, but estimates range from ten to thirty million. Despite the enormous loss of life, both in the transatlantic passage and in the New World, that slavery entailed—perhaps the life of one slave for each ton of sugar produced—Africans not only made sugar production profitable but they also replaced Indians as the dominant ethnic group in the Caribbean. Ironically, it may have been maize, a New World food taken to Africa by Europeans, that underlaid population growth on that continent and enabled Atlantic slavers to keep the sugar, cotton, and tobacco plantations of the New World supplied with labor.

The real meaning of 1492 can be seen in Montserrat, a small Caribbean island a scant twenty miles from Antigua. When Columbus named it in 1493—after the Jesuit monastery in Spain where he had prayed a novena for a safe return from his second voyage to the New World—Montserrat was typical of Caribbean islands, a lush tropical rain forest providing shelter and sustenance to Arawak Indians.

The indigenous population and vegetation of Montserrat have disappeared. The Indians were replaced, first by Irishmen dumped there as a result of England's domestic policy and then by slaves from Africa; the rain forests were replaced by sugar plantations. Indeed, the ruins of more than one hundred sugar mills still dot the landscape. Although much of Montserrat is rain forest once again, there is a major difference from 1492. Many of the plants on the island today were introduced by its European and African occupants.

The people, of course, are also different today, and this perhaps is the most enduring legacy of Columbus. The population of Montserrat is more than 90 percent black, with the parent stock largely West African in origin. Yet, ask a Montserratian his nationality and he is likely to say, "Mon, I'm Irish!" And why not? The spirit of those early Irish residents pervades all aspects of life on Montserrat. Not without reason is it known as the Emerald Isle of the Caribbean. Many of the place names are Irish as are the dominant surnames of its black residents, many of whom speak English with a touch of brogue. Traditional musical instruments on the island include the fife and drum; one of the folk dances bears a remarkable resemblance to the Irish jig; and island residents celebrate Saint Patrick's Day with exuberant festivities. This then is the true significance of 1492. It was as if a giant blender had been used to concoct an exotic drink, but the ingredients were the plants, animals, and people of two hemispheres, and the product was really a new world.

and economic benefits for the people of Europe. Returned crusaders had been exposed to new ideas, unfamiliar technologies, strange foods. They had developed a taste for Eastern spices, precious gems, silks and satins, and other exotic attractions from the Orient. Contact with Arab civilization also inspired a revival of interest in other Mediterranean cultures, a rebirth of the classical learning of ancient Greece and Rome. The Renaissance promoted the rise of nationalism, the growth of cities, interstate commerce, a monetized economy, and a merchant class. Printing presses and universities flourished as did the teaching of subjects long neglected—astronomy, chemistry, cartography, and navigation. Newly built seaworthy vessels combined with the development of new navigational aids such as the compass, astrolabe, and quadrant, sailing charts, and a rising spirit of adventure and enterprise caused Europeans to break free of physical as well as psychological boundaries.

It was then that a united Spain burst upon the world scene, unleashing forces of radical change. In addition to sponsoring Columbus's first voyage of discovery, Ferdinand and Isabella in 1492 completed seven centuries of conflict on Spanish soil with the Moorish invaders by capturing Granada. Flush with patriotic and religious fervor, the monarchs chose to expel not only the Moors but also the Jews, thereby dispersing across Europe many of the people who were to become the intellectual architects, financiers, and artisans of the global transformation begun by Columbus and continued by Spain's rivals in the decades that followed.

What Columbus had really discovered was, however, another old world, one long populated by numerous and diverse peoples with cultures as distinct, vibrant, and worthy as any to be found in Europe. Tragically, neither Columbus nor those who followed him recognized this truth. The Europeans regarded the peoples whom they encountered in North and South America more as natural objects—another form of the fauna to be discovered and exploited—than as human beings with histories as rich and ancient as their own. They could not imagine that these peoples could offer anything of aesthetic or cultural value. Only recently, in fact, have we come to realize that what Columbus did in 1492 was to link two old worlds, thereby creating one new world.

Another tragedy of 1492 was the failure of the Europeans to recognize the fragility of the American environment. They set to work despoiling the resources of the New World as quickly as they began destroying its peoples. What had taken nature thousands of centuries to create was largely undone in less than five, beginning in September 1493, when the Admiral of the Ocean Sea returned to America at the head of an armada of seventeen ships. These disgorged on Hispaniola some fifteen hundred would-be empire builders and a Noah's ark of Old World animals and plants including horses, cows, pigs, wheat, barley, and shoots of sugarcane, which was, next to disease, perhaps the most detrimental contribution of the Old World to the New.

Sugarcane merits censure because it harmed both man and the environment. With sugarcane came the plantation system and the initial assault on the tropical rain forests of the New World. Sugarcane was a labor-intensive crop that absorbed huge human resources, beyond what was needed for altering the landscape, to make large-scale production both possible and profitable. Although American Indians were readily enslaved, they just as readily died—in vast numbers from the diseases the Europeans introduced to the New World along with their plants and animals.

Consider, for example, what occurred on the island of Hispaniola, where Columbus established Santo Domingo, the first permanent colony in the New World. In neither Haiti nor the Dominican Republic, which share this island today, are there any

were the plants, animals, and people of two hemispheres, and the product was really a new world.

The continuing influence of Columbus's voyages is an important part of the "Seeds of Change" story. Five hundred years ago, people gave little thought to the environment. Today, acid rain, waste management, global warming, and similar environmental issues command concern the world over. Five hundred years ago tropical rain forests seemed an inexhaustible resource and an impediment to progress. They are now disappearing at the rate of thirty-five acres a minute. Today, rain forests are considered essential to human welfare and a resource to be treasured and husbanded. Not only may rain forests have a major influence on the world's climate, but they shelter plant and animal species unknown to science. The destruction of the rain forests is likened to the destruction of a vast library whose volumes remain unread and unappreciated because the languages in which they are written have yet to be translated.

The Columbus Quincentenary should be a time of contemplation. It is a time to think upon the achievements of those first adventurers who dared to challenge the mythical monsters that had kept Europe isolated by a moat of ignorance, doubt, and anxiety, but it is also a time to reassess and evaluate our options for the future. Ours is an era when decisions have instant ramifications around the globe. Man's continued achievements offer much promise for a healthier, happier future; but technological advances often have environmental implications. The forces of change and despoliation set in motion by Columbus have not abated; if anything, they are accelerating.

As the title of an exhibition at the National Museum of Natural History at the Smithsonian Institution as well as the title of this book, "Seeds of Change" reflects the research and interests of a group of eminent scholars, each of whom has contributed an essay to this volume.

Four of these scholars deserve special recognition, for their lifework and counsel shaped the "Seeds of Change" project from the start. Foremost is Alfred Crosby, who was the first historian to understand and interpret the rapid transformation of the New World after 1492. His book *The Columbian Exchange* opened a new field of research and informed the work of countless scholars, as a careful reading of the present volume will reveal. Three other members of the core committee were William McNeill, author of *Plagues and Peoples*; Sidney Mintz, author of *Sweetness and Power*; and Henry Hobhouse of Great Britain, to whom we are indebted for our title. Hobhouse's book *Seeds of Change*, the story of the global impact of five plants—maize, tobacco, quinine, tea, and sugar—led directly to the exhibition, part of the museum's Quincentenary activities. "Seeds" is used in a generic sense to illustrate the changes that resulted when plants, animals, diseases, and people were exchanged between the Old and New Worlds as a result of Columbus's voyages of discovery.

Although literally hundreds of examples could have been chosen to represent the Columbian exchange, the scholars working on this project selected five: sugar, maize, disease, the horse, and the potato. Many will argue effectively that alternative plants and animals—tobacco, quinine, rubber, cattle, or a dozen others—were more important. Nonetheless, each of these seeds was chosen because of the human dimension in its story. Sugar led directly to the enslavement of Africans and the transformation of New World ecosystems; maize fed the Africans that provided the manpower for American plantations; the potato, like maize, was developed by American Indians and has become a basic food of people around the globe; disease, especially smallpox, measles, even the common cold, wrought havoc with New

World peoples. Exact figures will never be known, but scholars believe that 50 to 90 percent of the Indians in North and South America died of diseases introduced from Europe. Most of those who died never saw a European; the diseases radiated throughout the New World much like ripples in a pond. The demoralization and psychological devastation caused by Old World diseases also worked in favor of the European settlers in displacing the native peoples.

Obviously, the Indians of the Americas have little cause to celebrate 1492. Indeed, some Indians plan to wear black armbands in 1992, and there is rising support for a national day of mourning to honor all the Indians who died as a result of the arrival of the Europeans on these shores. Most Indians echo the sentiment of George P. Horse Capture, who contributed one of the essays in this volume: "For America's Indians 1992 means that we will have survived as a people for five hundred years."

The horse, the fifth seed of change, was one gift from the Old World that Indians came to embrace and cherish. At first amazed by these strange creatures, the Indians of North and South America eventually became some of the finest riders the world has known. Even today members of many North American tribes regard the horse as a vital part of their culture.

"Seeds of Change," both this volume and the exhibition at the Smithsonian's Museum of Natural History, is an attempt to interpret the true meaning of Columbus five hundred years after that fateful day when the Admiral of the Ocean Sea stepped ashore in the Bahamas and unwittingly changed the course of world history. As the essays in this volume show, every seed of change, whether accidental or intentional, had both positive and negative consequences. These essays examine many different aspects of the biological transformations begun in 1492. Although each essay, like each seed, is a story unto itself, taken as a whole, they reveal the larger story behind the events that followed Columbus's voyages of discovery and their implications not only for those of us alive in 1992 but for generations to come.
