An Extraordinary Experiment in Human Development

1491: New Revelations of the Americas before Columbus. Charles C. Mann. Knopf, New York, 2005. 478 pp., illus. $30.00 (ISBN 140004006X cloth).

In studying the complex ways that human societies on Earth have interacted with their environments, we only have one experiment to observe—or do we? There were at least 14 millennia of Earth history during which two separate, isolated experiments in the development of agriculture, complex states, trade, disease, resource exploitation, empires, sustainability, and collapse were running in parallel in the Eastern and Western Hemispheres. In 1492 these two experiments were joined, with disastrous consequences for the inhabitants of the Western Hemisphere. But new revelations of the history of this hemisphere before 1491 are significantly expanding our understanding of the factors that shaped human and environmental coevolution.

In *1491: New Revelations of the Americas before Columbus,* science writer Charles Mann takes his readers on a compelling and readable tour of the Western Hemisphere as it would have looked in 1491. Fifty years ago, almost all historians would have provided a very short and simple tour. According to Mann, they would have described "two continents of wilderness, populated by scattered bands whose ways of life had changed little since the Ice Age. The sole exceptions would have been Mexico and Peru, where the Maya and the ancestors of the Inka were crawling toward the foothills of Civilization." This vision of the pre-Columbian Western Hemisphere still pervades common understanding. But our knowledge of the state of the Americas in 1491 has expanded dramatically, and Mann's tour conjures a hemisphere that is almost unrecognizable compared with the picture painted by earlier historians.

In 1492 Columbus arrived bearing European pathogens. This and subsequent pathogen deliveries would ultimately devastate the huge human population of the Americas and leave subsequent European explorers and settlers with the mistaken impression that the entire hemisphere was a lightly populated wilderness. Mann presents the accumulating evidence that, because of the uniquely susceptible genetic makeup of the pre-Columbian human population in the Americas, huge portions (as much as 95 percent in some cases) of native populations were lost to European diseases they had never before encountered. It turns out that Native Americans have far less diversity than Europeans in their human leukocyte antigens (HLAs), molecules inside most human cells that are essential to one of the body's main defenses against pathogens. European populations in the 1400s had diverse HLA profiles, and this allowed a large percentage of them to resist most diseases, even the plague. But Native American populations had HLA profiles dominated by a very small number of types. The result was that they were unusually susceptible to Old World diseases.

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Using this information, along with reports of the sizes of the decimated native populations remaining when settlers arrived, leads to much larger estimates of the human population of the Americas in 1491. For example, Mann argues that in 1491, the central valley of Mexico was the most densely populated place on Earth, and that the Amazon basin was home to a human population in the millions, thriving on a complex, stable agroforestry rather than slash-and-burn agriculture.

The details of these and many other newly emerging stories about the histories of societies large and small across the Americas, from the Iroquois in the northeastern United States to the Inka along the southern Pacific coast, make for compelling and engaging reading. One of the more interesting stories has to do with the development of maize (corn) as a staple grain in the Americas. Europeans domesticated wild grasses through selective breeding of a common mutation that causes the seeds not to shatter (release from the stem) until they can be harvested, but unlike European grains, corn's direct wild ancestor has never been found. And unlike European grains, maize cannot propagate itself but requires human intervention. The most likely explanation, according to Mann, is that domestic corn was created, almost from scratch, either as a hybridization of two related species or as the determined selection over at least a decade of what seems to be the closest existing ancestor of maize (teosinte, a plant with no food value in its wild state). The details of this story are fascinating and still not settled. Mann expertly weaves together both the technical details of the research and the personal details of the individuals involved in the continuing search for the origins of maize.

Another insight that flows from Mann's synthesis is that the idea of "wilderness" that has motivated environmentalists needs to be rethought. The "wilderness" that Europeans discovered in America was the result of millennia of extensive and intensive interactions between the environment and human populations as large as those in Europe at the time. The emerging history of both hemispheres is one that leads toward a more integrated view of humans as major components of the ecosystems they were part of over a range of spatial and temporal scales.

But what is perhaps most compelling about this emerging overall history of the Americas is its degree of parallel with the history of the Eastern Hemisphere. Even though there were huge differences in the biogeography, native plant and animal resources, and other features of the two hemispheres (Diamond 1997), the development of human societies followed roughly similar and parallel paths, and at roughly the same rates. Mann marshals the accumulating evidence that rather than lagging by several centuries to millennia, as previously thought, human societies in the Western Hemisphere were at roughly the same state of development as in the Eastern Hemisphere in 1491. Had populations in the Western Hemisphere not been especially susceptible to eastern pathogens, things may have turned out quite differently. Had the germs not done such a thorough job, it is doubtful, in Mann's view, whether the guns and steel of the Europeans could have overcome the Native Americans.

Of course, these two grand hemispherical experiments in human development were not controlled or well monitored, and we have to piece together the results from the partial fragments left behind. We cannot test hypotheses directly and must rely on comparative analysis, "experiments of opportunity," and a "weight of evidence" approach. But this synthesis can now make use of a growing ability to assemble an integrated human and environmental history. For example, reconstructions of global climate based on ice core data now reveal that the period from about 14 thousand years ago was an exceptionally warm and stable period in Earth's climate history (Dahl-Jensen et al. 1998). Why is it that, even though biologically modern humans were around for more than a hundred thousand years, agriculture did not arise until a few thousand years into this stable period? And it arose more or less simultaneously and independently (according to Mann's synthesis) in both the Eastern and Western Hemispheres. It is clear that simple linear cause-and-effect explanations are insufficient to explain complex phenomena like the emergence of agriculture, but it is also clear that a key prerequisite for agriculture is a relatively stable and predictable climate.

Continuing efforts to synthesize and integrate human and environmental history will shed more light on this and many other questions about the emergence, development, and sustainability or collapse of human societies (Flannery 1994, Diamond 2004, Costanza et al. 2006). Mann has made a substantial contribution to this important field of inquiry, a field that will help us create a more sustainable and desirable future by better understanding the complex ways humans have interacted with their environment in the past.

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