Biodiversity in Agriculture

Domestication, Evolution, and Sustainability

The introduction of plant and animal agriculture represents one of the most important milestones in human evolution. It contributed to the development of cities, alphabets, new technologies, and – ultimately – to civilizations, but it has also presented a threat to both human health and the environment.

Bringing together research from a range of fields including anthropology, archaeology, ecology, economics, entomology, ethnobiology, genetics, and geography, this book addresses key questions relating to agriculture. Why did agriculture develop, and where did it originate? What are the patterns of domestication for plants and animals? How did agroecosystems originate and spread from their locations of origin? Exploring the cultural aspects of the development of agricultural ecosystems, the book also highlights how these topics can be applied to our understanding of contemporary agriculture, its long-term sustainability, the co-existence of agriculture and the environment, and the development of new crops and varieties.

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Foreword

Bruce D. Smith

This landmark volume eloquently underscores the enduring legacy of Jack Harlan's broad-ranging and multiple-perspective approach to considering the past development and future challenges of agricultural economies, world-wide. It also highlights the remarkable degree to which plant and animal domestication and agricultural origins continue to expand as a general research question across a wide spectrum of different disciplines in the biological and social sciences.

General areas of inquiry are continually emerging in science, and for widely varying periods of time, they attract and reward researchers, providing interesting and unfolding sequences of questions before eventually closing down as their research potential is exhausted. The evolution of agricultural economies, from first origins to future developments, is an excellent example of an extremely long-lived problem area which not only has witnessed substantial growth since the pioneering efforts of Vavilov, Braidwood, Harlan, Heiser, MacNeish, and others, but also holds the very real promise of continuing to expand and provide new research questions for generations to come.

Many of the reasons for this continued expansion of interest and research are obvious. Initial domestication and the subsequent development of agricultural economies was not a single isolated event, for example, but rather occurred in perhaps a dozen different world regions or more, as our distant ancestors independently domesticated a wide variety of different species at different times and in different temporal sequences, providing a rich set of complex regional-scale developmental puzzles for comparative analysis. The subsequent diffusion of domesticates and agricultural economies out of these centers of agricultural origin add to the set of regional-scale comparative examples available for study, with almost every world area experiencing the eventual transition from hunting and gathering to food production economies.

Along with offering complex regional-scale developmental puzzles world-wide, the general research topic of agricultural origins also encompasses the domestication of a rich variety of plants and animals. Each of these in turn provides another complex set of interrelated questions at the species level of analysis for both archaeologists and geneticists: where and when and from which wild progenitor population did different domesticates develop, and in what kinds of environmental and cultural contexts? The past decade in particular has witnessed remarkable advances in our understanding of the early history of a rapidly expanding list of domesticated plants and animals.

Along with establishing clear and lasting templates for how to approach domestication and agricultural origins at both the regional and species levels of analysis, focusing on sub-Saharan Africa and its crop plants, Jack Harlan also framed the central issues involved in the larger-scale comparative analysis of different centers (and noncenters) of domestication. In a series of classic papers, Harlan and colleagues also illuminated the cause and effect of evolutionary relationships at work during the initial domestication of seed plants; how human planting and harvesting of stored seed stock created new sets of selective pressures, with the resultant automatic adaptive response of the cultivated plant populations reflected in the genetic and morphological changes identified today under the general heading of the *adaptive syndrome of domestication*.

Jack Harlan clearly recognized that as a general area of inquiry, *agricultural origins and evolution* encompasses a vast landscape of different research questions and calls for sustained communication and collaboration between researchers in many different disciplines. The Harlan II Symposium, and the rich variety of cross-illuminating perspectives that are represented in this volume, reflect the enduring importance of such scholarly interaction, as well as the continuing expansion of interest in this fascinating and rewarding topic.

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