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The Neolithic Transition and the Genetics of Populations in Europe



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AND THE GENETICS
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Dedicated to the memory of Adriano Buzzati-Traverso,
to whose inspiring teaching this research owes its source.

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PREFACE

The aim of this book is to bring together and provide an overview of the various studies that we have undertaken over the last twelve years on the shift from hunting and gathering to early farming as a new way of life in Europe and the implications of the neolithic transition for the genetic structure of human populations in Europe. One of the challenges that we have had to face in writing the book involves the range of academic backgrounds that different readers are likely to possess. On one hand, there is the need to present archaeological material to those whose training and experience are primarily in human genetics and the biological sciences. On the other, concepts and quantitative methods used in human population genetics must be developed in a clear manner for those coming from backgrounds in archaeology and the social sciences. We have thus tried to concentrate on the larger picture in the body of the text and to place more technical material and points of interest to specialists in notes to the respective chapters.

It is worth stressing at the outset that the chapters of the book dealing specifically with the neolithic transition are not written as a “prehistory” in the traditional sense of the term: that is, the fashioning of a narrative that attempts to portray diverse facets of the early life of a given region or period. Rather, we have adopted a more limited and thematic focus, essentially that of outlining what is currently known about the origins of early farming in Europe. Readers who become interested in more detailed regional studies may find it useful to consult the references listed in the bibliography.

Another point that needs to be made here is that our current knowledge of neolithic sites in most parts of Europe is still quite limited. Moreover, the nature of what is known is often dependent on when and how archaeological fieldwork was conducted. We can fully expect our understanding of the neolithic transition in Europe to increase substantially as further fieldwork is done over the next twenty-five years. Our own experience working at early neolithic sites in the region of Calabria in southern Italy, which is described elsewhere, offers a good example of how rapidly our knowledge

of an area can change once intensive research is initiated. On a more technical note, radiocarbon dates are cited throughout the book in conventional C-14 years and not calibrated ones, since the calibration curves available at the present time (see Chapter 4) extend back only to about 7000 B.P. and do not cover the full time range of our study.

A few words should also be said regarding the hypothesis of demic diffusion that is developed in the book and the changing fashions in archaeological explanation. Diffusion was for many years one of the leading forms of explanation in archaeology. More recently archaeologists have come to be more cautious and selective in its use. One of the criticisms commonly leveled against diffusion is that not enough attention is paid to process. Geographical distributions of artifacts or other remains tend to become in themselves their own explanations. As part of the reaction against earlier diffusionism, a counter position—what for want of a better term might be called “indigenism”—has become popular in some quarters. Sources of change and innovation are sought within indigenous populations or local cultural contexts. This position, in which cultural change is cast as a self-contained affair, is probably no more tenable in its extreme form than the one it attempts to replace. Individual case studies need to be examined on their own terms and not forced into rigid molds. There may be less conflict between the study of diffusionary processes and the recent emphasis on endogenous cultural developments in prehistory than is often implied. Here we shall put forward the wave of advance model as a means of explaining a major part of the spread of early farming in Europe. As we shall see in the discussion of this model in Chapter 5, processes operating essentially at the local level will be employed to account for the diffusion of early farming in Europe.

The science of genetics is scarcely more than a century old, and yet it has given us a new dimension to the biological world. The past fifty years in particular have witnessed the rapid accumulation of a vast body of genetic data on human populations. The challenge to the geneticist remains to discover patterns in this wealth of information and to explain those patterns recognized. There has emerged in the last few years an increasing awareness of the complex relationships that may hold between genes and culture in human populations. It has been traditional in much of Western thought for the biological nature of groups or individuals to be regarded as determining cultural events or historical developments. In the case of the neolithic transition in Europe, it would appear

that the arrow of causality is reversed. We shall argue that cultural events in the remote past played a major role in shaping the genetic structure of human populations in this part of the world.

We would like to thank the many archaeologists and geneticists who over the years have either provided us with information or offered useful comments on our work. Special gratitude is extended to the following persons who collaborated in various aspects of the research done at Stanford University: Marcus Feldman, Juliana Hwang, Paolo Menozzi, Alberto Piazza, Sabina Rendine, Laura Sgaramella-Zonta, and Diane Wagener. Finally, we would like to acknowledge support that we have received from the National Institute of Health, the Department of Energy, and the National Science Foundation.

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CHAPTER 1

INTRODUCTION

Human evolution is now thought to extend back well over two million years, but it is only during the last ten thousand years that food production has emerged as the main way by which humans provide for their subsistence. Previously, people met their food needs by means of hunting and gathering—that is, through the exploitation of seasonally available wild animals and plants. Agriculture, therefore, is a recent development when viewed in terms of the full course of human evolution. Associated with the shift to farming as a way of life are changes in technology, demography, and social organization. In Europe, this transformation did not occur as a sudden event but involved processes that required many generations to be worked out. Thus, rather than thinking in terms of a “neolithic revolution,” as did the prehistorian V. Gordon Childe, we prefer to speak of a neolithic transition. In trying to account for the spread of early farming in Europe, we began to realize that the neolithic transition may have a major bearing on patterns of genetic variation observed among human populations in Europe. The interpretation of such patterns has long represented a challenge to population geneticists. There is the intriguing possibility that two seemingly unrelated research problems, one concerned with cultural development in the remote past and the other with the genetic structure of living populations, are closely linked.

At first glance, it would appear to be surprising for two researchers such as the authors, coming from fields as different from one another as prehistoric archaeology and population genetics, to find themselves working together. When we first began our collaboration in 1970, it was far from clear where the study would lead, and much of our initial effort was spent in trying to bridge the differences in our backgrounds. As various lines of investigation have unfolded over the last twelve years, it has been our experience that basic questions have become more clearly defined, and there is a better sense of how answers can be obtained. The aim of this book is to bring together the various studies that we have undertaken and to attempt a synthesis of the work that has been done in collaboration.