A Companion to Biological Anthropology

Edited by
Clark Spencer Larsen

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Dedicated to Phillip L. Walker (1947–2009), biological anthropologist and friend

Contents

List of Illustrations

List of Tables

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Introduction

Clark Spencer Larsen

The genius of Franz Boas, the founder of the discipline of anthropology in the United States, was rooted in his holistic approach to understanding the human condition, both from cultural and from biological perspectives. His strong interest in the biology of humanity played a key role in the rise of biological (physical) anthropology, the study of human evolution and variation.[1] It was Boas's vision that laid the foundation for the growth and development of biological anthropology as a distinctive and successful scientific discipline. But it was also the vision and leadership of two other key players that made the field what it is today: Aleš Hrdlička of the Smithsonian Institution and Earnest Albert Hooton of Harvard University (see Little and Sussman, Chapter 1). Hrdlička founded the professional journal – *American Journal of Physical Anthropology* – and was the driving force in the organization of the professional society – American Association of Physical Anthropologists. Hooton taught and trained nearly all the first generation of PhDs, who would in turn educate the next generation of professional biological anthropologists. Between the two of them, Hrdlička and Hooton dealt with virtually every subject area in biological anthropology. Simply put, it was their collective intellectual visions that lay the foundation for the diverse and growing enterprise of biological anthropology as we see it thriving in the early twenty-first century.

The contributors to this book are the direct beneficiaries of these earlier, remarkable individuals – Boas, Hrdlička, and Hooton – who pioneered areas outlined by Michael Little and Robert Sussman in their opening chapter to this book. Space limitations prevent the presentation of a truly comprehensive history of the discipline, but Little and Sussman cover quite a lot of ground, which introduces the beginnings and the history of biological anthropology and many of the areas discussed in this book.

While this is a highly diverse field of study, all of its various areas of interest are unified by the focus on evolution. That, I believe, is what gives biological anthropology such a unified approach to the study of humankind. A century and a half ago, the central mechanism underlying evolution – natural selection – was first described by Charles Darwin and Alfred Wallace (Weiss and Buchanan, Chapter 2). It was this

mechanism that has given such a profound insight into what explains biological variation and evolution. In order to make sense of the complexity of past and present living forms, the development of systematics and taxonomy were well under way by the time Darwin and Wallace thought about evolution. While taxonomy in particular was originally built on the notion that life is static, Darwin's and Wallace's pioneering work showed that life is dynamic and that earlier ancestral species give rise to later descendant species. Today the reconstruction of phylogeny – evolutionary trees showing ancestral–descendant relationships – serves as the framework for interpreting the biology of past and present organisms (Wood, Chapter 3).

The mechanisms that drive evolution are few – natural selection, mutation, genetic drift, and gene flow (Weiss and Buchanan, Chapter 2; Relethford, Chapter 4; and others in the book). But, as Relethford points out, these forces interact in many different combinations and often in complex ways. It is the interaction of these evolutionary forces that determines genetic variation both within and between populations. As the implications of these evolutionary forces came to be realized in the first half of the twentieth century, a group of early geneticists, especially Sewall Wright, Ronald Fisher, and J. B. S. Haldane, tackled key issues by using mathematics and founded the new area of study called population genetics (Relethford, Chapter 4).

As applied to humans, population genetics is fundamental to explaining patterns of genetic change, and biological anthropologists have been at the forefront of the continued development of this area of study. More than any other discipline, biological anthropology recognized the importance of variation in DNA markers for interpreting evolutionary change in primates, including humans. The DNA revolution transformed the field of genetics, occasioning the development of molecular genetics. New genetic markers provided an essential supplement to the rough maps of genetic variation identified by using traditional markers (e.g. blood group polymorphisms, PTC tasting, and lactase deficiency: see O'Rourke, Chapter 5). In addition, the application of genetics to the study of dental and skeletal variation has extended back in time our understanding of the operation of evolutionary forces in earlier human populations. These analyses have also shown that to compartmentalize human variation into discrete groups called "races" is incorrect (Caspari, Chapter 6). While biological anthropologists have long recognized that biological variation in humans cannot be categorized, the race concept is alive and well, both in the public sphere and in various areas of scientific investigation.

Boas recognized very early in his career that the study of growth and development provides special insight into understanding human variation. Ever since his early studies, biological anthropologists have studied the entirety of the human life span, from conception through to senescence and death (Crews and Bogin, Chapter 7). Humans are unique in the way they mature, both prior to birth and after. For example, humans are the only primates to have menopause. Moreover, health in later stages of life is profoundly affected by negative environments. It is now recognized that poor health in the youngest stages of growth and development – well prior to birth – predicts poor health in adulthood and earlier death.

Biological anthropologists are learning that adaptation to extreme environments and the spread of humans into a remarkably wide spectrum of terrestrial habitats in later human evolution have been key to understanding variation in today's populations (James, Chapter 8). The origin of *Homo sapiens* was in an equatorial setting in