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Human paleobiology

Human Paleobiology provides a unifying framework for the study of human populations, both past and present, in a range of changing environments. It integrates evidence from studies of human adaptability, comparative primatology, and molecular genetics to document consistent measures of genetic distance between subspecies, species, and other taxonomic groupings. These findings support the interpretation of the biology of humans in terms of a smaller number of populations characterized by higher levels of genetic continuity than previously hypothesized. Using this as a basis, Robert Eckhardt goes on to analyze problems in human paleobiology including phenotypic differentiation, patterns of species range expansion and phyletic succession in terms of the patterns and processes still observable in extant populations. This book will be a challenging and stimulating read for students and researchers interested in human paleobiology or evolutionary anthropology.

ROBERT B. ECKHARDT is Professor of Developmental Genetics and Evolutionary Morphology in the Department of Kinesiology at the Pennsylvania State University. His previous books include *The Study of Human Evolution* (1979) and *Population Studies on Human Adaptation and Evolution in the Peruvian Andes*, with Terry W. Melton (1992).

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OWEN GLENDOWER: I can call spirits from the vasty deep.

HOTSPUR [HENRY PERCY]: Why, so can I, or so can any man;
But will they come when you do call for them?

William Shakespeare, *King Henry IV*

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Preface

The face of human evolutionary studies that outsiders most commonly see is a nomenclatural thicket pruned by recurrent extinctions. Hypothetical rounds of species succession are so characteristic of paleoanthropology that they often are echoed in novels that use the evolutionary past as settings. Thus William Golding's *The Inheritors* represents Neanderthals while they are being exterminated by anatomically modern humans, as do Jean Auel's *Clan of the Cave Bear* (plus its imaginative sequels) and Björn Kurtén's *Dance of the Tiger*. Works of this sort add a lot of local color and speculative detail to conceptions of phylogeny that date back over a century.

As a result of these works, professional and popular, many nonspecialists believe that the central activity in paleoanthropology consists of argumentation about how many species existed, how many of them lived simultaneously during various time periods, and which ones emerged as survivors while their contemporaries passed into the oblivion of extinction.

These recurrent disagreements make the field appear to be so forbiddingly complex that even scientists in closely allied specialties can feel overwhelmed. This comment is based on my own experience over a period of years with a respected colleague, Paul T. Baker, who now has retired from his position as Professor of Anthropology at the Pennsylvania State University. Paul's area of specialization is the biology of human adaptability. In this realm he has been recognized internationally with various honors, including the Huxley Memorial Medal of the Royal Anthropological Institute. This recognition came because he helped to provide insights into the mechanisms by which human populations have adapted to a variety of environmental challenges: desert heat; high altitude hypoxia; and rapid acculturation to new food sources and activity patterns.

During the 15 years that we were colleagues in the same Anthropology Department at Penn State, Paul and I had a continuing dialogue that was reopened by each new announcement of a fossil hominid discovery. In this recurrent collegial conversation he would take the position, as ever more discoveries of fossil hominids were made, that it was becoming increasingly difficult to make any sense of the overall course of human evolution. In this

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viewpoint, Paul is in respectable company. Regarding interpretation of the rapidly expanding hominid fossil record, it has been stressed by some workers, such as Ian Tattersall in *Evolutionary Biology at the Crossroads*, that with each new fossil the picture has tended to become more confused, or at least more complex, and phylogenies have regularly needed substantial readjustment to accommodate such new finds (Tattersall, 1989a: 140). A similar argument was made by Fleagle (1995). Even more recently, paleoanthropologists have been warned that with regard to a cranium discovered in 1989 at Sterkfontein (Stw 505): another new specimen . . . is about to wreak havoc on our view of hominid evolution (Falk 1998:1714).

As a scientist, my steadfast response to Paul Baker, as well as to others, has been that additional data points should make a pattern easier to discern, not harder – as long as a field has an adequate theoretical structure. Paul Baker had, in fact, taken a short but important step toward building such a structure in the Huxley Memorial Lecture that he delivered to the Royal Anthropological Institute in 1982. Published the following year in the *New Scientist*, that paper sketched in the inductive and deductive arguments for a fundamentally important concept: the need to establish connections between the biology of extant populations and their predecessors of the past.

This book builds on those ideas. It is not a beginning, because it relies heavily on important work by many other scientists who have carried out the studies on which I have drawn for examples and perspectives; nor is it an end, because I have provided only a modest introduction to the many ways in which studies on living populations can be used to provide a perspective for studies of those that lived before. Much more remains to be done.

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An author's debt to a publisher, commonly large, is especially so here. Without Alan Crowden the task would not have been started, and without Tracey Sanderson it might never have been finished. Rita Owen ensured that what had been written also was readable. From conception, through constructively critical readings, to location of essential references, valuable assistance has been given by several editorial board members of the Cambridge Studies in Biological and Evolutionary Anthropology: Nina Jablonski, Robert Foley, Gabriel Lasker, and Derek Roberts.

The writing has been done in a setting that betters Joseph's dream recorded in Genesis: I am now enjoying the seventh good year after as many lean ones. For this a double dose of gratitude accrues to my valued colleague Gerry McClearn, former Dean of the College of Health and Human Development at the Pennsylvania State University – first, for bringing me into this congenial environment, and second, for recruiting my current Department Head, Karl Newell, who nurtues accomplishment by exceptional example.

Throughout I have endeavored to give credit for the concepts synthesized here, whether discussed critically or approvingly. In providing the necessary documentation I have been assisted by many librarians abroad and at home, particularly those in the Radcliffe Science Library at Oxford and the Life Sciences Library of the Pennsylvania State University. The graphs in Chapter 11 showing morphological continuity between Neanderthals and extant humans represent the work of my friend Bill Dean; all other figures were executed by Rick Sharbaugh. I thank Derek Pearsall for providing a context showing that the dismissive epithet 'sparse and fragmentary evidence' (Chapter 12) tells more about limitations of interpretation than of evidence.

Many researchers will find their work incorporated here. In particular, Roscoe Stanyon helped guide me through the current literature on genomic evolution, while his colleague Stephen O'Brien took time to vet my inferences about probable molecular relationships among past hominid populations. Among legions of others cited in the text, Dave Frayer, Phil Gingerich, Clifford Jolly, Maciej Henneberg and Alan Templeton

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merit special recognition; while appreciative of their contributions, I accept responsibility for the interpretations made.

I join Alan Fix (author of another book in this series) in acknowledging a profound intellectual debt to Frank Livingstone, who has long been a wellspring of ideas for so many of us.

Last, Carey, my wife and constant companion of 36 years, remains the one who makes all conceivable things not only possible, but worthwhile.

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