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This volume presents the findings of a selection of pioneering research studies in which molecular techniques have been used to address key questions in biological anthropology, for example about the human genetic system, the geographical movements of human populations in the past, and primate evolution. Providing not only a timely overview of current research, this book also presents an insight into the potential significance of molecular biology in the decades to come, that will be of interest to all biological anthropologists as well as molecular biologists, human geneticists, palaeontologists and evolutionary biologists.

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# Molecular applications in biological anthropology

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*To Dr Michael H. Crawford on whose shoulders I have been  
privileged to stand*

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## *Preface*

The idea for producing this volume came during a symposium held in Kansas City, Missouri in the spring of 1989. At that time there were few molecular approaches to biological anthropology as the techniques of molecular biology were only just entering the field. Some pioneering studies were nevertheless under way, including those by most of the authors in this volume.

In the molecular revolution that is ongoing in biomedical research, disease and other genes are being mapped, cloned and sequenced at a pace unthinkable only a few years ago. There is an ongoing initiative to map and, eventually, sequence the entire human genome. Precise and sophisticated studies of genomic organization and gene regulation have been and are being carried out using the increasingly diverse armamentarium of molecular biology. Yet, the use of these tools to study questions in biological anthropology is only now becoming widespread. The unique perspective and straightforward focus of biological anthropology is also on the verge of a molecular revolution that will open avenues of research previously unavailable. The papers in this volume only hint at the possibilities to come.

To provide the necessary historical context, this collection opens with a short developmental history of one of the focal phenomena of current molecular research: the restriction fragment length polymorphism. In other areas of genetics there is a respectable time–depth with quantitative genetics going back to Galton in the last century, population genetics developing over the lifetime of Sewall Wright, and anthropological genetics starting up in earnest with the discoveries of Landsteiner early in the century. The molecular technology relevant to biological anthropology, on the other hand, is younger than most of those using it.

In the six chapters that follow that introduction, a wide range of applications of molecular techniques is presented. Rogers (Chapter 2) discusses the potential anthropological applications of DNA sequence variants. Hixson (Chapter 3) offers a specific application of molecular techniques in studying a non-human primate model of a human disease, atherosclerosis. From these studies a great deal is being learned about

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non-human primate genetics. Weiss and Turner (Chapter 4) focus on one particular class of DNA sequence variation – the VNTR/hypervariable – and show the many uses to which it may be put. In Chapter 5 Flint and colleagues turn their attention to the human globin gene clusters and show how molecular studies of these regions have opened up an enormous storehouse of information which can be applied to questions of both micro- *and* macro-evolution. Melnick and colleagues (Chapter 6) do much the same by presenting the ‘other genome’ – the mitochondrial DNA. Finally, Marks (Chapter 7) takes a closing look at the use of the entire genome as an entity for addressing broad evolutionary questions.

This volume has taken some time to assemble and finalize. The patience of the Cambridge University Press has been laudable. I wish to specifically acknowledge the efforts of Ms Rebecca Dill-Devor for producing edited copies of all of the chapters, Ms Nelly Mark for final typing of some of the chapters and for standardizing computer-ready materials, and Ms Roberta Rich for finalizing all of the artwork.

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