A window into the past

The Molecule Hunt: Archaeology and the Search for Ancient DNA

By Martin Jones

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The advances in genetics over the past two decades are having a considerable impact on disciplines that seek to elucidate the past. *The Molecule Hunt* by Martin Jones offers a brief but comprehensive look at how molecular analysis and the reconstruction of ancient DNA sequences have affected archaeological science. This well-written and entertaining book takes a grand tour of topics relevant to archaeological interest, ranging from the origin of our species to the spread of agriculture to forensic applications to the evolution of human disease. Throughout the book, Jones offers his perspective of a changing science with attendant changes in research focus offered by new methods. Jones notes, for example, that when he began his archaeological career he spent much time cleaning pottery of dirt and the remains of ancient biomolecules in order to get down to the business at hand—analyzing the pottery. Today, the focus has changed somewhat, and more attention is given to the biomolecules in the dirt. Old questions are being approached in new ways, and new questions are emerging as archaeologists more fully utilize biomolecular analysis.

This book is not a technical monograph, but serves a broad audience. Complicated laboratory and statistical methods are explained in clear form that does not presume prior knowledge. Even so, I think the book would make an excellent supplement to courses in archaeological method and theory.

The book is organized into 11 chapters and includes a rather extensive bibliography. The first chapter sets the stage for the rest of the book by describing how archaeology has changed with the adoption of

molecular methods. Subsequent chapters alternate between discussions of technical issues relevant to molecular analysis and of applications of the new technology and the insights it provides.

For example, Chapter 2 provides some of the history of the field of ancient DNA research and Chapter 3 discusses the implications of this research to the ongoing debate over modern human origins and the fate of the Neandertals (an area that remains more contentious than Jones suggests). Chapter 4 then digs deeper into methodology, providing an excellent discussion of the conditions needed for preserving ancient DNA. To illustrate the application of molecular analysis to archaeological investigation, Chapter 5 describes what the analysis of ancient plant material tells us about the origins and spread of agriculture, while Chapter 6 deals with what can be learned about animal domestication by examining ancient DNA in horses, cattle, and other animals. Chapter 7 looks at how genetic analysis of living and ancient human populations helps us answer questions about population history and past migrations, including classic examples from the anthropological and genetic literature—the spread of farming across Europe and the possible role of demic diffusion, the initial inhabitation of the Americas from Asia, and the origin of Polynesians.

Chapter 8 (*Beyond DNA*) shows what can be learned about ancient molecules other than DNA, including blood antigens, other blood proteins, phytoliths, and isotopes. Examples of archaeological application are plentiful and include what we can learn regarding population history, domestication, cooking methods, and diet (the latter concluding with an interesting analysis of what the “Iceman”

ate before he died). Chapter 9 focuses on forensic applications of ancient DNA analysis, such as the identification of Joseph Mengele and the Romanov case. Chapter 10 looks at the *Enemies Within*, the microorganisms that cause human disease and death, and gives examples of how historical and archaeological questions of epidemiology can be addressed with the analysis of ancient biomolecules. The last chapter serves as a short review of the book's contents, placing them again in the context of ongoing changes in archaeology.

I enjoyed this book very much and recommend it as an excellent introduction to the new bioarchaeology (molecular analysis) that compliments skeletal analysis and other classic methods of bioarchaeology. I particularly liked the broad scope of the book. As an anthropological geneticist, I was already familiar with the studies of human populations, but found that the discussions of other animals' and plants' remains gave me a broader perspective on the use of molecular approaches to understanding the past.

There are a few interpretive points that I might argue with, such as the treatment of modern human origins and the supposed separate species status of Neandertals. Although it is clear that Neandertal mitochondrial DNA is different from that of living humans, the view of speciation and replacement (although favored by many) is not the only interpretation for this finding, and I have argued elsewhere that the mtDNA evidence can be viewed as compatible with Neandertals being a subspecies that contributed somewhat to our ancestry, although probably in small amounts. I am also not convinced that recent studies of DNA reject, as Jones asserts, elements of Cavalli-Sforza's demic diffusion interpretation of the genetic history of Europe, which suggests that when agriculture was developed in the Near East, it spread to Europe with a wave of immigration. While more recent arguments suggest that the relative genetic contribution of the expanding farmers was less than that of indigenous Europeans, who were hunter-gatherers, the genetic evidence still points to a geographic gradient caused by gene flow out of the Near East into Europe. Still, these are minor quibbles that do not detract from the main purpose of the book, its usefulness, or the enjoyable read it provides. □