Anthropology Book Forum
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Of environment and genes: How to address bones' morphological variability

Review by Diane Martin-Moya

Reading the Bones: Activity, Biology and Culture
by Elizabeth Weiss
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Reading the Bones: Activity, Biology and Culture considers the study of bones' features as a way to understand osteological variation – Is the environment a suitable explanation? Or genetic selection? Is it possible to study specific markers to reconstruct past population activity pattern? The author's approach to such questions, posed in this book, is original and supported by a large and varied selection of studies and an exhaustive glossary. This book considers issues encountered in bioarcheological studies (human and animal) and offers an overview of the methodologies that have been used on specific aspects of the bone (from traditional to the use of 3D imagery). Through modern clinical and genetic studies, the author compares and correlates archaeological studies ranging from general analysis to specific material culture elements to understand morphological variations. This book includes a wide variety of examples from the late prehistoric to modern times, while also covering a vast chronology and corresponding relevant literature. These elements make the book of interest to bioarcheologists that are interested on morphological change and their relationship with genetic and/or non-genetic influences (biomechanics, disease, nutrition).

The book succeeds in synthesizing a broad range of explanations of bone's variation and how to identify and observe them to conduct an efficient and complete preliminary analysis. Except for the first chapter, which is a concise but useful reminder of fundamental concepts in bone modelling and modification through ossification process and development -each chapter has a clear introduction, with all concepts clearly explained from the beginning (entheseal change, osteoarthritis, stress fractures).
The first chapter, while aimed at informed, but non-specialist readers, is nevertheless interesting for

graduate students in bioarchaeology, professors, and undergraduate students. Moreover, the author wrote the book mostly for educational purposes (initiation to a large panel of methodologies), but depending on the academic background and knowledge, this book is more addressed to a public that is engaged in bioarchaeological research for the field or the laboratory (archaeologist be warned). Also, it is important to mention that this book is not for skull specialists, it is more oriented for those interested in post-cranial and especially long-bone analysis. Which is unfortunate since, there are more and more research papers that highlight the plasticity of some areas of the skull (craniofacial mostly) and their link with environmental factors (Betti et al., 2010; von Cramon-Taubadel, 2011, 2014; Galland et al., 2016, Katz et al., 2017).

The chapters in this volume are well developed and complete, from a presentation on data collection strategies to new technologies (tomography, 3D models) and different methodologies developed by diverse specialized researchers. Through examples and a critical argumentation, the book presents the positive and negative aspects of different settings and research questions. To illustrate, in Chapter 3 about "Entheseal change", the author discusses the characteristic that offers three-dimensional methodologies and the advantages to access directly the geometry of the bones thought the collect of electronic data that record spatial coordinates (taken trough homologous landmarks). Nevertheless, it is important to consider all the parameters that constitute the project and it suggests being cautious about the time it requires to collect the data which can be a real disadvantage depending of the context (in the field or other deadlines). Moreover, each chapter offers a well-documented, complex and multifactorial perspective on clinical research contrasted with a variety of archaeological papers not only regarding the physical activity influence (hunter-gatherer vs farmer) but the impact of age, sexual dimorphism (social organization, hormones) and at to a lesser extent, climate. All those configurations presented through different angles offer an important background to formulate critiques by giving open perspectives on those subjects.

Aside from the comprehensible descriptions of the different aspects discussed in the book, there are very few illustrations (nine photos, five diagrams and two graphics for the whole book). Even if the reading is very fluid, illustrations could give fuller representations of the subject treated. The illustrations of bioarchaeological studies are essential because they offer visual support, a semantic correspondence, with what the author wants to demonstrate. It is a necessary communication tool that meets the objectives of the book, especially when exposing pathologies, cellular processes, and new

methodologies.

Nonetheless, even if the osteological aspect is particularly well detailed, the genetic angle lacks in description. For example, when the environmental interpretation is not adequate to explain specific aspects of the problematic encounter, then it is hypothesized as being of genetic origin but most of the time it is not backed by genetic, cellular studies. Thus, compared to the profusion of explanations for osteological questions, readers' expectations are not fulfilled regarding genetic analysis. It is merely mentioned in the book, but the emergence of epigenetic research has allowed us to study this gray area between cell differentiation and phenotypic differentiation. Recent advances in research in the epigenetic and paleo-epigenetic fields show that alterations in regulatory expression can lead to changes in phenotypic variation -or the study of how the causal interaction between genes and their products allow the modification of the genome expression. From my point of view, when the question "environment or genes" were presented I was hoping for a more balance view (as much as possible) of the connection between morphological, phenotypical, epigenetic and genetic discussions within the book.

The book is useful for post-cranial and paleo-pathologist researchers, and it is an essential contribution regarding the interaction between environment, culture and genes when looking at phenotypic variation and adaptation in specific archaeological contexts. The clinical aspect is most relevant, and it offers some perspective to understand extrinsic and intrinsic conditions affecting osteological variation due to physical environment adaptation and biomechanical stress. Also, one of the major beneficial approachs of this book concerns the presentation of various strategies to collect and analyze the data depending on the research considered, the archaeological origin and the material resources available. This book considers both genetic variation and a large spectrum of environmental aspects that has affected past human individuals -such as nutrition, diseases, social organization, physical activities, altitude, weather and other which is essential to understand the various interactions and shifts in morphological variation through time.

In conclusion, this book helps to draw the most accurate portrait of past population's ways of living and it expresses every necessary aspect through a critical review of what has been done and how those analyses and results interact, while also proposing an alternative point of view that pushes the reader to criticize his work and to elaborate proper hypotheses with which to conduct their research.

Works Cited:

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