

BREATHING LIFE INTO FOSSILS: TAPHONOMIC STUDIES IN HONOR OF C.K. (BOB) BRAIN

EDITED BY

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INTRODUCTION

TRAVIS RAYNE PICKERING, KATHY SCHICK AND NICHOLAS TOTH

Taphonomy, the study of the processes leading to the fossilization of organic remains, is one of the most important avenues of inquiry in research into human origins. By carefully examining processes and patterns in the modern, observable world (actualistic studies), we are able to gain crucial insights that can be used in the data collection, analysis and interpretation of the prehistoric record. Such actualistic studies have grown tremendously in the past few decades, providing a wealth of information for use in paleoanthropological research.

The conference *African Taphonomy: A Tribute to the Career of C.K. (Bob) Brain* was convened at the Stone Age Institute in Bloomington from April 29–30, 2004 to discuss the latest research and developments in taphonomy—a field introduced to African prehistorians in large part through the early work of C.K. (Bob) Brain. Brain's (1981) book *The Hunters or the Hunted?*, published after roughly 20 years of accumulated actualistic research, is still heralded as a classic treatise in human evolutionary studies. It was apparent from the conference presentations that Brain's work, as summarized in that book, continues to have a far-reaching and lasting impact. In honor of this legacy, we have collected in this volume 16 papers that emanated from the conference. As with Brain's own work, it is difficult to pigeonhole many of the chapters herein; most cross-cut various types of actualistic work. We have, however, made an effort to arrange the contributions into five broad themes.

The first set of papers includes two essays that discuss the influences on Brain's development as a scientist and his own subsequent impact on paleoanthropology. Chapter 1, by Bob Brain, presents the central storyline of the development of African cave taphonomy. The broad

outline of that story will be familiar to many readers, but it is quite illuminating to read Brain's own take on the relevance of its various components. Especially valuable and inspiring are the dual themes of optimism and fun that run through his lively narrative. Science can and should be a pleasurable pursuit, one worthy of a lifetime's devotion, as in the case of Brain. Gary Haynes, in Chapter 2, a sociohistorical account of Brain's influence on the development of taphonomy in Paleoindian studies, stresses another aspect of Brain as a scientist and person. Haynes makes the point that we would all do well to use Brain's approach as a model in our own research:

“He reviewed others' work, collected data, and spelled out his alternative interpretations with grace and tact... Brain's contribution to Paleoindian research went beyond merely providing examples of taphonomic studies to emulate. To his greatest credit, he also showed us how to stalwartly present a case without alienating colleagues and friends.”

The remaining chapters are largely empirically based, but can still be crudely sub-divided. A group of papers by Naomi Cleghorn and Curtis Marean, Francis Thackeray, and Kathy Schick and colleagues deal ostensibly with mammalian carnivores as taphonomic agents—one of the major concentrations of Brain's research. Cleghorn and Marean (Chapter 3) discuss the growth of a general model for bone survival in zooarchaeological assemblages, with a special emphasis on carnivore destruction of skeletal elements. Their model separates bones into a low-survival set (elements that lack thick cortical bone) and a high-survival set (elements comprised predominantly of thick cortical bone) and argues that because

of their resistance to complete destruction (through processes such as carnivore ravaging), the dense midshaft portions of limb bones are the most useful category of bone for reconstructing early hominid behavior. Thackeray's chapter (Chapter 4) also focuses on carnivore contributions to the formation of paleoanthropological bone assemblages and on limb bone shaft fragments. In particular, he explores the usefulness of mean limb bone shaft lengths and carnivore: ungulate ratios to assess the biotic agent(s) of bone accumulation at the important early hominid sites of Kromdraai, Swartkrans and Sterkfontein (South Africa). Schick and her colleagues (Chapter 5) present data on the bone assemblage from a modern striped hyena den they excavated in Jordan. The presentation is of particular relevance to the South African paleontological record since it is hypothesized that an extinct subspecies of striped hyena (*Hyaena hyaena makapani*) was a likely contributor of the Makapansgat Limeworks Grey Breccia fauna. This is the very fauna upon which Raymond Dart based his notion of the Osteodontokeratic Culture of *Australopithecus prometheus* (now *A. africanus*).

The third set of chapters, by Alan Walker, Martha Tappen and colleagues, Kay Behrensmeyer, Rob Blumenshine and colleagues, and Kathleen Kuman, explore site- or landscape-level issues in taphonomy and paleoanthropological assemblage formation. Walker's (Chapter 6) discussion of two Miocene sites on Rusinga Island (Kenya) deals with the most remote time period covered in the book and some of the most fascinating taphonomic circumstances known in primate paleontology. R114, which yielded the type specimen of *Proconsul heseloni*, is the site of large hollow tree that was ultimately infilled by matrix and bones, while the Kaswanga Primate Site is possibly an infilled carnivore burrow. Chapter 7, by Tappen and colleagues, describes taxonomic and taphonomic aspects of the important Pleistocene fauna from Dmanisi (Republic of Georgia), associated with the earliest securely dated hominids outside of Africa. The site is tantalizing taphonomically, with the authors' concluding preliminarily that it does not conform to the "plutonic ideals of human habitation sites, hyena dens, or mass death sites." Behrensmeyer's (Chapter 8) contribution returns to Africa, with a report on changes in skeletal part survival and bone surface modification in the Amboseli (Kenya) ecosystem over her 30 years of work there. She links many of the changes to a marked increase in the spotted hyena population and the decline of other large predators over the last decade, suggesting that such an inter-specific demographic in the past would have resulted in increased competition for carcasses and minimal opportunities for aggressive scavenging by early hominids. Landscape taphonomy is also the concern of Blumenshine and his colleagues. In Chapter 9, they present data from their Olduvai Landscape Paleoanthropology Project (Tanzania). In order to reconstruct landscape facets existing during Bed I and Lower Bed II times within the Olduvai Basin, the researchers have

conducted modern taphonomic surveys in the Serengeti, along Lake Masek and the Lower Grumeti River. Especially fascinating is their study of crocodile taphonomy in these settings and its relevance for determining fine-scale landscape features. Kuman's chapter (Chapter 10) shifts focus from bones to stones and from East to South Africa, as she describes varying land use by hominids in the Stone Age. She concludes that nearly all of the earliest sites in South Africa are secondary deposits within karstic cavities, while actual occupation of caves occurred only much later, after 600,000 years ago. All other sites are open air and usually close to standing water. Kuman also elaborates on her current research on the late Acheulean and Middle Stone Age archaeology of the Mapungubwe National Park, in Limpopo Province (South Africa).

Two other papers, by Ron Clarke and Gail Krovitz and Pat Shipman, comprise the fourth section of this volume. Clarke (Chapter 11) provides taphonomic comparisons of three australopithecine skeletons from Sterkfontein (South Africa). The Little Foot (Stw 573) skeleton, from the Member 2 level at that site, is far more complete than the partial torsos from Member 4, Sts 14 and Stw 431, which each have only one partial limb preserved. Clarke concludes that Stw 573 was apparently mummified and buried before its bones separated, while the two Member 4 skeletons were probably ravaged by the same type of biotic actor, resulting in their similar degree and kind of incompleteness. Krovitz and Shipman (Chapter 12) provide methods for reconstructing the taphonomy of immature hominid crania, of particular relevance to the human fossil record, which has yielded many important specimens of juvenile status. Indeed, the authors then apply their methods to the cases of three such specimens, the Taung Child (*A. africanus*), Mojokerto (*Homo erectus*) and Herto BOU-VP-16/5 (*H. sapiens idaltu*).

The final four chapters are organized together because of their emphasis on hominids as taphonomic agents. Travis Pickering and his colleagues (Chapter 13) elaborate upon Brain's interpretation of early hominid behavior at Swartkrans Member 3 (South Africa) by presenting evidence of 163 fossil specimens bearing newly identified stone tool cutmarks and hammerstone percussion damage. Data presented on tooth marks indicate that carnivores contributed more predominantly than hominids to the formation of the Member 3 fauna, but hominids still appear to have been capable foragers. Based on the anatomical distribution of cutmarks, it is argued that hominids gained access to carcass parts usually defleshed early and entirely by carnivores before that happened. Although mostly a presentation of data on carcass modification by felids, the work of Manuel Domínguez-Rodrigo and his colleagues (Chapter 14) makes the point that hominid-induced bone damage is the preferred class of data upon which inferences of hominid behavior should be made. In response to previous models, they emphasize that the order of carnivore and hominid access to carcasses could be modeled more

specifically and usefully with a taxon-specific (felid versus hyenid) consideration of tooth mark frequencies, and present some useful steps in this direction. Henry Bunn's chapter (Chapter 15) is also concerned with inferring early hominid access to carcasses, but concentrates on the utility of his ethnoarchaeological observations of Hadza foragers (Tanzania) for doing this. He emphasizes that Hadza maximize their return rates by transporting to base camps essentially whole carcasses of zebra size and smaller animals. This makes sense when one considers that the sophisticated chopping (metal axes) and boiling technologies of these modern humans assure they can extract nutrients from skeletal parts that must have been difficult or impossible for Oldowan hominids to exploit. Tim White and Nicholas Toth (Chapter 16) close-out the volume by discussing the likelihood that feeding homi-

nids modified bones with their teeth, as well as with stone tools. The chapter will serve as an important caution to taphonomists against automatically attributing every tooth mark observed in a fossil fauna to carnivores. The broader implication is that the usefulness of models of carnivore-hominid interaction that are dependent on tooth mark frequencies might be suspect.

Twenty-five years after the publication of the *Hunters or the Hunted?*, Bob Brain's masterwork, each of the chapters in this volume reflects the continuing and encompassing influence of the man and his work on the field of paleoanthropological taphonomy and its practitioners. Bob is still relevant and the research questions he posed and then so eloquently explored still resonate and inspire advancement in our understanding of human evolution.

Breathing life into fossils: Taphonomic studies in honor of CK (Bob) Brain. Bloomington, IN: Stone Age Institute. Press; 2007. p. 167-173.Â skeleton's stratigraphic and taphonomic circumstances, geochronological position, taxonomic status, and functional morphology. Bilateral Asymmetry of the Forearm Bones as Possible Evidence of Antemortem Trauma in the StW 573 Australopithecus Skeleton from Sterkfontein Member 2 (South Africa). Preprint. Breathing new life into treatment advances for respiratory failure in amyotrophic lateral sclerosis patients. REVIEW. Susana Pinto*1 & Mamede de Carvalho1,2.Â In honor of this legacy, we have collected in this volume 16 papers that emanated from the conference. As with Brain's own work, it is difficult to pigeonhole many of the chapters herein; most cross-cut various types of actualistic work. We have, however, made an effort to arrange the contributions into five broad themes.Â Twenty-five years after the publication of the Hunters or the Hunted?, Bob Brain's masterwork, each of the chapters in this volume reflects the continuing and encompassing influence of the man and his work on the field of paleoanthropological taphonomy and its practitioners. "Breathing Life into Fossils" is a major contribution to taphonomic studies in paleoanthropology and natural history. This book emanates from a Stone Age Institute conference celebrating the life and career of naturalist Bob Brain, a pioneer in bringing taphonomic perspectives to human evolutionary studies. Contributions by leading researchers provide a state-of-the-art look at the maturing field of taphonomy and the unique perspectives it provides to research into human origins. This important volume reveals approaches taken to the study of bone accumulations at prehistoric sites in