

# Paleontology and Geology of Laetoli: Human Evolution in Context. Volume 1: Geology, Geochronology, Paleoecology and Paleoenvironment

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Laetoli, a site famous for its *Australopithecus afarensis* fossil remains and associated fossilized hominid footprints, has been revisited by researchers from 1998 to 2005, who have recovered new *A. afarensis* and the first *Paranthropus aethiopicus* specimen to have been found at a site outside of the Turkana Basin. This book, the first of two volumes, is devoted to these geological and paleontological investigations of localities on the Eyasi Plateau in Northern Tanzania. It visits, in nineteen specialist papers, the geology, paleoecology, and paleoenvironments of Laetoli. The newly discovered fossil hominins from Laetoli are presented in the second volume. While this volume is not divided into specific sections as such, the structure follows quite clearly from presenting the localities, and their stratigraphy and dating, onto articles relating to the geology and mineralogy of the area, then modern and fossil vegetation, followed by studies of mammalian fauna. A review of a collection of such detailed specialist works may lend itself to some dry writing on the part of the reviewer. The information provided by this volume, however, is very important to the study of hominin environmental contexts.

Chapters 1 through 4 present background of the recent research, information on the localities, and stratigraphy and dating of Laetoli. In Chapter 1, Terry Harrison outlines the history of excavations at Laetoli, and of the recent investigations (1998–2006) of the Eyasi Plateau localities. The basic scope of work and field personnel of the recent field seasons, is delineated, and there is a brief discussion of the geological investigations, radiometric age determinations, reconstruction of paleoecology, and systematics and paleobiology of fauna. A brief listing of the new fossil hominin specimens recovered is given but these are covered in more detail in Volume 2. Terry Harrison and Amandus Kweka present detailed information on the paleontological localities on the Eyasi Plateau in Chapter 2. Photos of the localities are provided, as well as maps of the Eyasi Plateau, and Laetoli, Kakesio, and Erese-Noiti area localities. Location names used by previous researchers have been matched with each other and with the names and locality numbers used by the current research group. In Chapter 3, Peter Ditchfield and Terry Harrison present a review of the stratigraphy of the localities visited by this research, including detailed drawings of the exposed sequences of each. The authors add to the work of previous investigators as well as reassessing Hay's (1987) litho-facies through the lens of

more recent research on the volcano-sedimentary process. In Chapter 4, Alan L. Deino presents the  $^{40}\text{Ar}/^{39}\text{Ar}$  dating which has helped refine the geochronology of the Laetolil, Ndolanya, Naibadad and Olpiro Beds.

Chapters 5 through 7 focus on the geochemistry and mineralogy of the Laetoli area. Chapter 5, by Godwin F. Mollel et al., begins with an analysis of the volcanic deposits of Laetoli localities and their possible volcanic sources. Lindsay J. McHenry compares the mineral compositions of individual tuffs within the Laetolil, Ndolanya, and Naibadad beds in the Laetoli and Kakesio areas in Chapter 6. Detailed charts of the mineral compositions of the tuffs are provided. In Chapter 7, Katherine A. Adelsberger et al. examine the geochemical and mineralogical characterization of Middle Stone Age tools and compare them with samples from possible source materials. Detailed tables of the major element and trace element compositions of the studied tools and possible sources are provided.

Chapters 8 through 11 focus on the present day and Paleolithic environments of the area through analysis of flora. In Chapter 8, Peter Andrews, Marion K. Bamford, Efre-Fred Njau, and Godson Leliyo map the vegetation of the Endulen-Laetoli area and present this information on present day vegetational zones and the related geology, soils, and topography. They include maps, transect sketches, and an extensive appendix of the species collected and their GPS locations. Lloyd Rossouw and Louis Scott, in Chapter 9, analyze phytoliths from sediment samples taken at different stratigraphic levels of several Laetoli localities. In Chapter 10, Marion K. Bamford presents an analysis of the fossil woods that were recovered from Lower Laetolil Bed age deposits at Noiti, 10km south of the main Laetoli area, and considers the inferred paleoenvironment. She discusses the fossil leaves, fruits, and seeds recovered from the Upper Laetolil Beds in Chapter 11.

Chapters 12 through 19 focus on faunal aspects of the paleoecology of the region. Chapter 12 presents a present day micromammal analysis to be used as a baseline for interpretation of the paleoenvironments of the Laetoli area. Because the proposed possible paleoenvironmental range of Laetoli can be found in the present-day Serengeti-Masai Mara ecosystem, Denné N. Reed analyzes modern micromammal communities in Serengeti, based on materials recovered from owl roosting sites. In Chapter 13, the taphonomy and paleoenvironmental implications of the fos-

sil micromammals of the Upper Laetolil Beds are then discussed by Denné N. Reed and Christiane Denys. The recent fieldwork at Laetoli and Kakesio also recovered coprolites from medium- and large-sized carnivores and some ruminants, and these are analyzed by Terry Harrison in Chapter 14. In Chapter 15, John D. Kingston presents his isotopic analysis of the enamel of fossil mammalian teeth and fossil ostrich eggshells recovered from the Laetolil and Upper Ndolanya Beds. Thomas M. Kaiser presents his study comparing the dental mesowear of ungulate taxa from the Upper Laetolil Beds and Upper Ndolanya Beds to extant species in Chapter 16. In Chapter 17, Laura C. Bishop et al. examine the postcranial fossil remains of antelope taxa from these same fossil beds and discuss the paleoenvironmental implications of and the taphonomic influences on the fossil antelope assemblages. In Chapter 18, Kris Kovarovic and Peter Andrews present their study of changes in the paleoenvironments of the 3.85–3.63 Ma Upper Laetolil Beds and the 2.66 Ma Upper Ndolanya beds, as indicated

by the ecomorphology of the Bovidae fossil specimens. And, finally, Denise F. Su discusses the habitat implications of the large mammal fossil assemblage of the Upper Laetolil Beds in Chapter 19.

The papers presented in this volume are in-depth and specialized in nature. The figures, photos, and tables within are well-presented. The researchers have added great detail to our understanding of the Pliocene environments of *Australopithecus afarensis* and *Paranthropus aethiopicus*. These specialized studies should prove of great use to researchers of hominid evolution, as well as those studying Pliocene flora and fauna. It would be a valuable inclusion to any library collection at institutions supporting students and researchers of hominid evolution.

#### REFERENCE

- Hay, R. L. (1987). Geology of the Laetoli area. In M. D. Leaky & J. M. Harris (Eds.), *Laetoli: A Pliocene site in northern Tanzania* (pp. 23-47). Oxford: Clarendon.