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Claude Guérin *Editors*



Senèze: Life in Central France Around Two Million Years Ago

Paleontology, Geochronology,
Stratigraphy and Taphonomy

Senèze: Life in Central France Around Two Million Years Ago

Vertebrate Paleobiology and Paleoanthropology Series

Edited by

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Cover image: Left, view of Senèze area looking west, with Trench 1 in center of image and Trench 2 (with sunshade) to the right; to left along the road is the office bungalow, to right the hamlet of Senèze, background rising to rim of crater (photo E. Delson, larger image in Fig. 1.7). Right, partial skeleton of *Allohippus senezensis* excavated in 2005, specimen FSL SEN 05-0081+ (photo A. Monguillon, see also Fig. 11.24 and Fig. 2.7).

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*In memory of Claude Guérin (1939–2016), colleague
and friend, co-director of the Senèze project and of
many other paleontological projects in France and
abroad*

Preface

The project to reopen the renowned paleontological site of Senèze began at a meeting of old friends. The investigators of the Vatera paleontological sites on the island of Lesvos, Greece, had invited a small group of colleagues to visit the area and participate in a short workshop from September 29 to October 2, 1999. The workshop “On Late Plio/Pleistocene Extinction and Evolution in the Palearctic: The Vatera Site” was held in Polichnitos, on Lesvos, and mainly included discussions of the mammalian fauna of the Villafranchian interval of Europe. Guérin and Faure presented a report on their recently completed study of the Saint-Vallier site and mammals, noting that it was older than the famous but less well-known locality of Senèze. Delson discussed his ongoing work on the large European cercopithecine primate *Paradolichopithecus*, which was known from Senèze and had also been recovered from Vatera-F.

During the meeting, Delson renewed his long acquaintanceship with Guérin and met Faure. He mused that it would be interesting to look again at Senèze, as Guérin and Faure had done at Saint-Vallier, bringing together a team of colleagues to investigate the geology, dating, paleontology, taphonomy and paleoenvironment. Guérin and Faure were thinking about a new project and were interested, so Delson suggested a joint venture, offering to seek funding in the US while Guérin and Faure directed the work on the ground. They agreed to start investigating the possibilities of a Franco-American team project.

Following numerous email exchanges later in 1999, Delson applied to NSF for a small grant, while Guérin and Faure requested a permit to work at Senèze. With the support of the Mayor of Domeyrat (the hamlet of Senèze is administratively part of the commune of Domeyrat), Faure submitted a request to the French Ministère de la Culture, Service Régional de l'Archéologie, Direction Régionale des Affaires Culturelles (Regional Archaeological Service of the Regional Office of the Ministry of Cultural Affairs); since 1945, Pleistocene paleontology in France falls under archaeological legislation. The Ministère de la Culture agreed to provide an authorization to survey and prospect for fossils. The NSF Physical Anthropology Program provided almost \$9,000 in a “high risk exploratory” grant to Delson with Co-Investigators Guérin, Faure, geologist Evelyne Debard (University of Lyon) and dating specialist Bonnie Blackwell (Williams College). Blackwell agreed to wait until the following year when a full season would occur if the first work proved successful, and the other four were joined by Andrea Valli, then a Ph.D. student with Guérin at Lyon. Details of that first season (and the following years) are presented in Chap. 1 below. As a result of that “chance meeting” on Lesvos, 7 years of fieldwork were undertaken at Senèze, and the results of that project are presented in this volume. It was long delayed by a combination of other

responsibilities and the need for detailed editing but the final product is an extensive analysis of this important Early Pleistocene locality, with implications for mammalian systematics and regional biochronology.

Acknowledgments We thank all our co-authors for their assiduous analyses of the data and fossils collected by our fieldwork as well as fossils recovered by earlier investigators. We thank all of the volunteer excavators who worked with us, the colleagues who assisted our studies and those who reviewed the manuscripts, the agencies that provided permits and funds, and the local landowners and other friends who made our work at Senèze possible. Each of them is named in the individual chapter acknowledgments, especially to Chap. 1. We thank Eric Sargis, co-editor of the VERT (Vertebrate Paleobiology and Paleoanthropology) series; Aaron Schiller, our Springer representative for VERT; and Henry Rodgers, Shalini Selvam and Jayanthi N. Narayanaswamy and their colleagues in the Springer production teams.

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Vertebrate Paleobiology and Paleoanthropology Series

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Senèze: Life in Central France Around Two Million Years Ago

Paleontology, Geochronology, Stratigraphy and Taphonomy

The paleontological site of Senèze (Haute Loire, central France) was discovered in 1892 inside a volcanic crater. For over 40 years, local peasant Pierre Philis collected fossils and sold them to French and Swiss museums. The site became world-famous for its well-preserved skeletons of ungulates and carnivores, as well as rare but well-preserved remains of primates and other mammals. It is considered the reference fauna for the late Villafranchian and MNQ 18 biochronological units of European mammalian evolution, but the lack of provenance data made modern research difficult. From 2000-2006, the multidisciplinary Franco-American Senèze Research Project undertook five seasons of major fieldwork, with the goals of clarifying the age, stratigraphy and taphonomy of Senèze, as well as finding additional remains, especially of the less well-known taxa. In this volume, following a history of study and summary of the new fieldwork, four geological chapters consider field methods, stratigraphy, volcanology and dating. Combining argon-argon ages and paleomagnetic calibration, the newly recovered fossils are shown to date between 2.20 and 2.08 Ma, with concentrations ca. 2.20-2.18 and 2.10-2.08 Ma, significantly older than previously thought. Chapters on palynology, ichthyology and ornithology are followed by eight chapters on the fossil mammals. The chapter on biochronology places Senèze among other sites at the start of MNQ 18, which is estimated to end ca. 1.7 Ma. Of some 2200 specimens known from the site, over half are cervids, with bovids, rhinocerotids and equids far behind. According to data from palynology and the habitat preferences of the more common mammals, the paleoenvironment around the Senèze maar would have included forest, woodland and grassland, perhaps in a warmer and moister climate than today. Taphonomic studies revealed that bones often rested a long time under water, lacked any indication of carnivore attack and often displayed pathologies in their joints. It is likely that most of the associated skeletons were preserved undisturbed after large mammals fell into the paleolake and drowned without being able to climb out.

This book responds to the long-held desire of later Cenozoic paleontologists to see a modern study of a site recognized worldwide as a biochronologic reference for the Plio-Pleistocene. Our study required renewed fieldwork using up to date techniques of topography, sedimentology, stratigraphy, geochronology and taphonomy. The systematic paleontology chapters are based on re-study of the entire body of Senèze fossils collected during more than a century of research. The volume will be of interest to paleontologists, especially those concerned with the evolution of the European fauna and with the taxa studied, as well as with paleoenvironmental reconstruction and biogeography. It will also be of value to mammalogists interested in analyses of near-modern taxa and to paleoanthropologists, archaeologists and taphonomists interested in the methods utilized and the role of Senèze as a comparative standard for a site of this age without human intervention. It will surely be an essential reference for all those who want to know more about *Life in Central France Around Two Million Years Ago*.

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