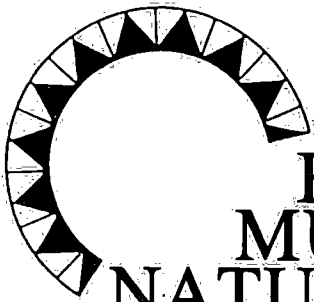


BULLETIN

of the



FLORIDA MUSEUM OF NATURAL HISTORY

**PALEONTOLOGY AND GEOLOGY OF THE
LEISEY SHELL PITS,
EARLY PLEISTOCENE OF FLORIDA**

PART I

**Richard C. Hulbert, Jr., Gary S. Morgan,
and S. David Webb, Volume Editors**

Volume 37, Pt. I, Nos. 1-10, pp. 1-344

1995

UNIVERSITY OF FLORIDA GAINESVILLE

Numbers of the **BULLETIN OF THE FLORIDA MUSEUM OF NATURAL HISTORY** are published at irregular intervals. Volumes contain about 300 pages and are not necessarily completed in any one calendar year.

F. WAYNE KING, *EDITOR*
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Communications concerning purchase or exchange of the publications and all manuscripts should be addressed to: Managing Editor, Bulletin; Florida Museum of Natural History; University of Florida; P. O. Box 117800, Gainesville FL 32611-7800; U.S.A.

ISSN: 0071-6154

CODEN: BF 5BA5

Publication date: March 14th, 1995

Price \$30.00 per set

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PREFACE

For the last two decades, the Leisey Shell Corporation has operated several shell pits along Tampa Bay southwest of Ruskin in Hillsborough County, Florida. Like many other mining operations in central and southern Florida, they excavate shells and sand for use in construction, primarily as road bedding. As is commonly the case in these shell pits, the Leisey draglines occasionally unearth vertebrate fossils. Beginning in the late 1970s and early 1980s several avocational paleontologists from the Tampa Bay Region, including Frank A. Garcia, Eric Fernandez, James L. Pendergraft, and James Ranson, periodically explored the spoil piles and quarry walls of the Leisey Shell Pit and built up substantial collections of vertebrate fossils. Eric Fernandez and James Ranson subsequently donated numerous fossils from these early years of collecting at the Leisey Shell Pit to the Florida Museum of Natural History (FLMNH, formerly the Florida State Museum).

The situation at the Leisey Shell Pit changed dramatically in July 1983 when a dragline exposed a tremendous concentration of fossil bones. Fortunately, Frank A. Garcia was collecting fossils in the Leisey Shell Pit shortly after the dragline exposed this bone bed, now known as the Leisey Shell Pit 1A Site or Leisey 1A for short (Hulbert and Morgan 1989; Webb et al. 1989). He initially found a great number of bones of camels, horses, and other large mammals literally covering the spoil piles. Frank then tracked the fossils to their source, a richly fossiliferous layer of bones within the exposed stratigraphic section (Garcia 1993).

Shortly afterward he was able to enlist the cooperation of the manager and owner of the Leisey Shell Pit, Eric Hunter and C. E. "Bud" Leisey, Jr., respectively, who temporarily ceased quarrying in that area. In all, the Leisey Shell Corporation held off mining Leisey 1A for 15 months, thus allowing the nearly complete excavation of the site and recovery of many thousands of important fossils. For this alone the scientific community is deeply indebted to the owners of the Leisey Shell Pit.

For the remainder of 1983, Frank A. Garcia, Ronald J. Shrader, Donald O. Ward, James L. Pendergraft, and their friends excavated about a quarter of Leisey 1A. Of the specimens they recovered, many were later donated to the FLMNH, including the skull and partial skeleton of *Gymnogyps kofordi* Emslie 1988, a new species of large bird closely related to the California condor. In December of 1983 Frank A. Garcia donated a large collection of Leisey 1A fossils to the FLMNH. The Museum of Science and Industry in Tampa (MOSI) also houses a large sample of the specimens collected by Garcia in 1983. Although paleontologists at the FLMNH became aware of the importance of the Leisey find in 1983, their field work that year was concentrated on another site, Haile 21A near Gainesville, which ironically proved to be very similar to Leisey 1A in age.

In January 1984, S. David Webb and Frank A. Garcia met with Eric Hunter, William W. Casey, and C. E. "Bud" Leisey, Jr., to plan a major operation at Leisey in the spring and summer of that year. The owners of the Leisey Shell Pit transferred their ownership of the fossils to the FLMNH, and also generously offered to provide heavy equipment to remove overburden thus exposing a much larger area of the bone bed. Excavations at Leisey 1A resumed April 1, 1984 as a cooperative effort between the FLMNH, the Tampa Bay Mineral and Science Club, and the Leisey Shell Corporation. From April until mid-September of 1984 (except for a short break during the hottest weeks of the summer), several hundred volunteers donated many thousands of person-hours collecting vertebrate fossils and recording taphonomic data. This volunteer effort was coordinated by Frank A. Garcia, Rudi Johnson, Mickey Fowler, Ralph "Tony" Estevez, Ronald J. Shrader, Sue Bodishbaugh, Red Tincher, and Donald O. Ward. Without the tremendous contribution of the Leisey volunteers, only a small fraction of the Leisey 1A Site could have been excavated. It is not possible to

individually list all of the volunteers who freely offered their services during the spring and summer of 1984, but "you know who you are" and we are extremely grateful for your many contributions.

Teams of FLMNH paleontologists regularly made the nearly three hour commute from Gainesville to Leisey during 1984. These field crews were led by Steven D. Emslie, Richard C. Hulbert, Jr., David Kendrick, and Gary S. Morgan. Other FLMNH participants included Mary Ellen Ahearn, Mary B. Ferl, the late Howard H. Converse, Jr., Russell W. McCarty, Ann E. Pratt, S. David Webb, and David B. Wright. With its combination of high temperatures and humidity, frequent heavy thunderstorms, and swarms of hungry mosquitoes, the Florida summer is not the most ideal choice for paleontologic field work. Despite these hardships, the summer of 1984 is fondly remembered as one of the most enjoyable and productive in the history of paleontology in Florida. It remains to date the best example of cooperation between avocational and professional paleontologists in the state.

The major scientific importance of Leisey 1A was immediately apparent, both for the quantity and quality of its specimens. The 1984 dig attracted much attention from the local, state, and national news media, including a spot on NBC's Today Show and an article in Newsweek Magazine. Of special note was a lengthy Sunday feature in the Tampa Tribune, including a full-color poster entitled "Tampa Bay - One Million B.C." The scientific community was also quickly notified of the discovery, with presentations in the fall of 1984 at a symposium of the Institute for Tertiary-Quaternary Studies held in Dallas, Texas, and at the annual meeting of the Society of Vertebrate Paleontology in Berkeley, California. However, published descriptions of the site and its fauna were somewhat slower to appear. This in large part was due to the enormous number of vertebrate fossils collected over a short time span, perhaps as many as 50,000 identifiable specimens. Several years of preparation and curation were necessary before we had a firm grasp of the fauna as a whole. Indeed, many specimens from the 1984 dig remain uncatalogued, representing mostly camel and horse postcranials and isolated turtle shell elements.

Emslie's (1988) description of the extinct Leisey condor was the first published paper dealing directly with specimens from Leisey 1A,

although Berta (1987) had earlier mentioned the Leisey *Smilodon* sample. These were followed by the general overview of Hulbert and Morgan (1989) that named the Leisey Shell Pit Local Fauna and a discussion of the site's chronology by Webb et al. (1989). The presence of *Nothrotheriops texanus* from Leisey was mentioned by Akersten and McDonald (1991). The sample of *Holmesina* from Leisey 1A formed an important component of Hulbert and Morgan's (1993) study of evolutionary rates in giant armadillos.

Field work continued at Leisey after 1984, although at a less frantic pace. In the summer of 1986, members of the Tampa Bay Fossil Club (formed by fossil enthusiasts as a spinoff of the Tampa Bay Mineral and Science Club) led by Frank A. Garcia excavated what is now called the Leisey 1B site. This locality was actually the first bone concentration Garcia discovered at Leisey, but it could not be completely excavated when it was discovered in January 1981 without damaging a major road used in the operations of the quarry. In late November 1986 Garcia discovered another major site at Leisey, this time in a newly-opened quarry on the north side of Gulf City Road. This site is officially called Leisey Shell Pit 3A, but it is also known as the "Baby Llama Site." Unlike the other Leisey sites, which have a diverse array of large mammals, Leisey 3A consists primarily of associated skeletons of immature individuals of the long-legged llama *Hemiauchenia macrocephala*. Leisey 3A was primarily dug by volunteers from the Tampa Bay Fossil Club, with limited assistance from the FLMNH. In addition to the abundance of *Hemiauchenia*, Leisey 3A was rich in small terrestrial and freshwater vertebrates such as rodents, snakes, and fish. Excavations at Leisey 3A ceased in February 1987.

Many important specimens of vertebrate fossils were collected at Leisey between 1987 and 1992, including a partial skeleton of the giant ground sloth *Eremotherium* discovered by Frank A. Garcia in March 1992. Steven Beck, D. J. Bethea, Ralph "Tony" Estevez, Wayne Filyaw, Frank A. Garcia, John Miller, and James L. Pendergraft have all donated important Leisey vertebrate fossils to the FLMNH over the past several years. Quarrying in Leisey Shell Pit 3 ceased in 1992, but the Leisey Corporation acquired another tract of land east of Leisey 1A and mining began there in 1993. Therefore, the potential for significant new discoveries is certainly great.

Leisey has added an important perspective to vertebrate paleontology in Florida. After the publication of Webb's *Pleistocene Mammals of Florida* in (1974), the focus of vertebrate paleontological research at the Florida Museum shifted to older Miocene deposits in an effort to fill gaps in the record. In large measure this was due to the discovery of the Love Bone Bed in the mid 1970s and the renewed interest in Thomas Farm and other early Miocene sites in the early 1980s. The near simultaneous discoveries of Leisey 1A and Haile 21A reawakened interest in the early Pleistocene among FLMNH vertebrate paleontologists. Equally important, before Leisey, interest in Plio-Pleistocene terrestrial vertebrates from marine shell beds in south Florida was limited. Instead, the principal places to look for fossils of this age were always considered to be cave deposits and fissure-fills exposed by limestone quarrying in northern Florida (e.g. the Haile and Reddick sites) or in rivers using SCUBA gear (e.g. the Ichetucknee and Santa Fe River sites). Leisey changed this attitude, and led to subsequent important excavations at the Macasphalt (APAC), De Soto, and Richardson Road shell pits, among others.

The idea for the present volume was conceived shortly after the completion of the excavations at Leisey 1A in the fall of 1984. It was obvious that serious scientific study of the huge volume of vertebrate fossils accumulated from Leisey was beyond the capabilities of any single individual. Therefore, the three compilers of this volume entered into discussions about the feasibility of organizing a team of specialists on the various vertebrate groups to study the rich fauna from Leisey 1A. At first those asked to participate in the project were paleontologists associated with the FLMNH. Several obvious gaps in the coverage of the vertebrate groups were filled by former University of Florida students and associates of the FLMNH. By the middle of 1985, most of the participants had already begun the study of their respective groups.

Discovery of the Leisey 3A Site in late 1986 added a new dimension to the studies of the Leisey Shell Pit vertebrate fauna, as small vertebrates were abundant there. The papers on fish and small mammals were solicited for the Leisey Volume shortly after the discovery of these rich microvertebrate remains, and the studies of amphibians and reptiles and birds were both substantially augmented. Since the inception of the Leisey project, Gary S. Morgan and Richard

C. Hulbert, Jr., had been accumulating geological and stratigraphic data, as well as collecting samples of invertebrate fossils. These data eventually spawned two additional papers, an overview of the geology and vertebrate biochronology of the Leisey Shell Pit and a summary of the invertebrate paleontology. Paleontologists at FLMNH have begun multidisciplinary geochronological studies of several paleontological sites in southern Florida, including Leisey, that have interbedded strata containing marine invertebrates and terrestrial vertebrates during the past five years. Two further additions to the Leisey Volume, the ones on strontium isotope and paleomagnetic stratigraphy, are the results of these studies.

Even more recently we have continued to invite contributions that would broaden the coverage of this important site, including studies on palynology and plant macrofossils and vertebrate taphonomy. Certainly the most obvious gap in our coverage of the Leisey fauna and flora is the absence of studies on the various groups of marine microfossils, such as foraminifera, ostracodes, calcareous nannoplankton, and dinoflagellates. It should be noted that bulk sediment samples were collected throughout the stratigraphic section in both the Leisey 1 and 3 pits. These samples are still available for micropaleontological analysis.

Many present and former students and employees of the FLMNH have assisted in the curation and preparation of the huge collection of vertebrate fossils from the Leisey Shell Pit. Along with the editors of this volume, many others have made significant contributions to the curation of Leisey vertebrate fossils in the FLMNH collection, including Steven D. Emslie, David Kendrick, Laura Kozuch, Arthur R. Poyer, Ann E. Pratt, and Erika H. Simons. Russell W. McCarty, Howard H. Converse, Jr., Cedric Wynn, Patrick Hylton, and John Church prepared many of the larger Leisey fossils from plaster jackets. Mary Ellen Ahearn took the photographs appearing in many of the vertebrate articles. Dianna C. Carver patiently assisted with manuscript typing. We would like to extend our special appreciation to the managing editor of the FLMNH Bulletin, Rhoda J. Bryant, without whose assistance, expertise, and patience this volume would not have been completed.

We would like to thank the National Science Foundation (NSF) which provided monetary support for all aspects of the Leisey Project. Field work at Leisey was supported by NSF Grant EAR 8708045 to S.

David Webb. Curation of the Leisey vertebrates at the FLMNH was supported by NSF collection improvement grants BSR 8314649 and BSR 8902822 to S. David Webb and Bruce J. MacFadden, while curation of invertebrate fossils was supported by BSR 8711802 and 9002689 to Douglas S. Jones. We are especially grateful to the Knight Foundation, Reed and Barbara Toomey, and James and Lori Toomey, whose generous financial contributions funded the printing costs for publication of the Leisey Volume. Additional funding of publication costs was provided by the Division of Sponsored Research, University of Florida, and Georgia Southern University.

Last, but certainly not least, we and all of the many hundreds of professional and avocational paleontologists who have participated in excavations at the Leisey Shell Pit during the past decade, would like to extend our deepest thanks and appreciation to the owners, managers, and employees of the Leisey Shell Corporation, in particular, C. E. "Bud" Leisey, Jr., Kim Leisey, LeAnn Casey, William W. Casey, Eric Hunter, and Page Youngblood. The Leisey Shell Corporation did much more than just cease their operations in the vicinity of the two major Leisey sites in 1983-1984 and again in 1986-1987. They wholeheartedly supported the excavations by providing heavy earth-moving equipment and operators for removing layers of overburden and a storage trailer to protect equipment and specimens from the elements. The Leisey Corporation also provided funds for supplies, photographic and art work for many of the papers published here, and travel expenses to bring several of the Leisey specialists to Gainesville to study fossils. The tremendous success of the two major Leisey excavations would certainly not have been possible without the help of the Leisey Shell Corporation. The study of paleontology in Florida has benefitted immeasurably from their generosity.

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VOLUME 37, PART I

TABLE OF CONTENTS

1. Overview of the geology and vertebrate biochronology of the Leisey Shell Pit Local Fauna, Hillsborough County, Florida Gary S. Morgan and Richard C. Hulbert, Jr.	1
2. Strontium isotope stratigraphy and age estimates for the Leisey Shell Pit faunas, Hillsborough County, Florida Douglas S. Jones, Paul A. Mueller, Teresa Acosta, and Robert D. Shuster	93
3. Magnetic polarity stratigraphy and correlation of the Leisey Shell Pits, Hillsborough County, Florida Bruce J. MacFadden	107
4. Preliminary palynology and macroplant report for the Leisey Shell Pits, Hillsborough County, Florida Fredrick J. Rich and Lee Ann Newsom	117
5. Biostratigraphy and paleoecology of the Pleistocene invertebrates from the Leisey Shell Pits, Hillsborough County, Florida Roger W. Portell, Kevin S. Schindler, and David Nicol	127
6. Early Pleistocene freshwater bivalves (Mollusca: Unionidae) from the Leisey Shell Pits, Hillsborough County, Florida Arthur Bogan and Roger W. Portell.....	165
7. Taphonomy of the terrestrial mammals of Leisey Shell Pit 1A, Hillsborough County, Florida Ann E. Pratt and Richard C. Hulbert, Jr.	177
8. Chondrichthyes and Osteichthyes from the early Pleistocene Leisey Shell Pit local fauna, Hillsborough County, Florida Sylvia Scudder, Erika Simons, and Gary S. Morgan	251
9. Pleistocene amphibians and reptiles from the Leisey Shell Pits, Hillsborough County, Florida Peter A. Meylan.....	273
10. An early Irvingtonian avifauna from Leisey Shell Pits, Hillsborough County, Florida Steven D. Emslie.....	299