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PREFACE

With boots finally on the ground, the discovery of Late Cretaceous mammals on the island of Madagascar took only 20 minutes. Christine Wall, then a Ph.D. student at Stony Brook University, found a fragmentary, worn molariform tooth on the morning of July 20, 1993, at the first patch of outcrop we stopped to survey. I was amazed yet incredulous and doubting, my heart in my throat, when she showed me the specimen. After all, at that time there were only two mammalian sites of undisputed Late Cretaceous age, a vast swath of 34 million years, from Gondwanan landmasses—a productive one in South America (approximately 50 isolated teeth and jaw fragments from the Los Alamitos locality; e.g., Bonaparte, 1986a, 1986b, 1986c, 1990, 1992; Krause et al., 1992) and a less productive one in India (five isolated teeth from the Naskal locality; Prasad and Sahni, 1988; Prasad and Khajuria, 1990).

Examining the specimen with a hand lens, several hallmarks of dental 'mammalness' were evident—multiple roots, well-defined enamel border toward the cervix, inflation of the crown beyond the dimensions of the root, presence of a cingulum, and thick enamel. Could we have been so fortunate as to find a major fossil vertebrate microsite that morning, and the first mammalian specimen, only a short hike from where we had pitched our tents in the dark upon arrival the night before? How many more mammalian teeth, or even jaws, littered the surface, waiting to be plucked in the coming minutes?

Although the initial success was nearly immediate, the quest to find Late Cretaceous mammals on the island of Madagascar has endured for over 20 years. That first tooth could not be identified beyond Mammalia incertae sedis (Krause et al., 1994), and as the minutes of that first field season turned to days and then to five weeks, we found no more mammalian specimens in the strata then known as 'série de Maevarano' (Besairie, 1972) around the village of Berivotra in northwestern Madagascar. We both dry- and wet-screened several hundred kilograms of matrix from the initial locality (MAD93-01) and another highly fossiliferous site (MAD93-35) during that first field season. Then, in the following winter, picking through the concentrate from MAD93-35 yielded a tiny fragment of a tooth (consisting of only two cusps) that was questionably assigned to Multituberculata (Krause and Grine, 1996; Krause, 2013), but nothing else in the way of mammals. Over the course of the next 20+ years, only seven more isolated mammalian tooth specimens have been discovered. They have been assigned to three taxa: (1) the sudamericid gondwanatherian *Lavanify miolaka* Krause, Prasad, Koenigswald, Sahni, and Grine, 1997; (2) Marsupialia, gen. et sp. indet. (Krause, 2001; but see Averianov et al., 2003); and (3) Sudamericidae, gen. et sp. indet. (Krause, 2013). However, in 2002, we 'lab-discovered' a nearly complete skull and skeleton of a house cat–sized mammal that was serendipitously included in a plaster jacket collected in 1999 and thought to contain only a partial skeleton of a small crocodyliform (Krause, 2003). Description and analysis of this specimen has been delayed and complicated by a variety of factors, but now continues in earnest.

All of the mammalian specimens mentioned above were found in strata of the Maastrichtian-aged Maevarano Formation in the Berivotra and Masiakakoho study areas in the Mahajanga Basin of northwestern Madagascar (Krause, Rogers, et al., this volume:fig. 2) as part of a joint research venture initiated by Stony Brook University and the University of Antananarivo and dubbed the Mahajanga Basin Project. In 1999, we shifted some attention to a new field area approximately 100 km farther to the west of Berivotra, across the broad, sediment-laden delta of the Betsiboka River. Additional reconnaissance forays led by project geologist Raymond R. Rogers in 2001, 2003, 2005, and 2007 indicated the presence of fossiliferous beds in a new subunit of the Maevarano Formation, which we have since named the Lac Kinkony Member (Rogers et al., 2013). It represents a more coastal paleoenvironment than any of the three other named members (Rogers et al., 2000) and is extraordinarily rich in fish fossils. In 2010, a more focused effort led by Rogers to the Lac Kinkony Study Area, as part of the 10th expedition of the Mahajanga Basin Project, yielded University of Antananarivo (UA) 9972, the cranium and holotypic specimen of *Vintana sertichi*, a sudamericid gondwanatherian mammal that was recently named and described in a preliminary report by Krause et al. (2014). It is this spectacular specimen that is the subject of more complete documentation in this volume.

The specimen represents the first cranial remains of a gondwanatherian mammal; it was embedded inside an approximately 70 kg plaster jacket intended by its collector, Joseph J. W. Sertich, then a Ph.D. student at Stony Brook University, to sample a highly fossiliferous layer of rock matrix at the base of a tidally influenced channel. The fossils collected from the eroded surface of the bed consisted of an array of bones and/or teeth of mostly fishes, but also those of turtles and crocodyliforms. At the time the jacketed matrix was collected, there was no knowledge of the existence of the mammalian cranium inside, nor of the vertebrae of at least one new species of snake (Pritchard et al., 2014). The cranium was discovered via computed tomographic (CT) scanning of the plaster jacket in June 2011 by technician Joseph Groenke, who was later responsible for expertly preparing it free of its entombing rock matrix over the course of almost six months.

The record of Late Cretaceous Gondwanan mammals has improved considerably since the inception of the Mahajanga Basin Project in the austral winter of 1993 (e.g., Kielan-Jaworowska et al., 2004; Luo, 2007; Rougier et al., 2010; Rich and Vickers-Rich, 2012). As is typical for the evolutionary history of mammals, it is a record dominated by isolated teeth, with a few jaws sprinkled in for good measure, all of the latter coming from Argentina. Cranial material of Late Cretaceous Gondwanan mammals is in very short supply, essentially limited to two partial skulls of a new dryolestoid, *Cronopio dentiacutus*, recently described by Rougier et al. (2011) from the Cenomanian (probably lower Cenomanian; Garrido, 2010) of Argentina. Dryolestoids are part of the lineage leading to modern marsupials and placentals. A temporal gap of 22–34 million years separates the skulls of *Cronopio* from that of Maastrichtian-aged *Vintana* (timescale of Walker et al., 2012). The mammalian cranium documented in this volume is therefore the only one known from the entire Gondwanan supercontinent for well over 20 million years. As recently stated by Muizon (2011:51, 52), "Considering the poverty of the fossil record, any discovery of a reasonably well-preserved skull of a Mesozoic mammal is a major palaeontological event . . . [it] can be more relevant to our understanding of mammalian evolution and biogeography than hundreds of isolated teeth—even if teeth are the most common