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Virtual preparation of fossil bones from cave deposits in the Cradle of Humankind.

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The UNESCO World Heritage Site of the Cradle of Humankind, located 50 km northwest of Johannesburg in the Gauteng Province, is one of the most fossiliferous areas in the world. The dolomitic caves of this region have yielded several hundreds of hominin specimens, as well as several hundreds of thousands of fossilized bones of various extant and extinct mammals, birds, reptiles and fish. These fossils have been recovered from 15 different excavated localities and are dated as old as 4 to 4.5 million years ago (Way Point 160 in Bolt's Farm). The majority of these fossils are encased in calcified clastic sediments or so-called breccias, a very hard rock, which requires extremely meticulous manual preparation, and represents a heavy investment both in terms of time and money.

Virtual exploration of blocks of breccias, followed by virtual extraction of fossils from the calcified sediment (and possibly 3D printing), using 3D rendering software such as Avizo, constitutes innovative and efficient alternative methods. Here I present a few examples illustrating the potential offered by 3D imaging in the preparation of fossils encased in hard sediment. First, I describe virtual exploration of blocks of calcified clastic sediment using simple CT-scanner images in order to locate fossils and to conduct preliminary bone identifications. Secondly, I present the results of virtual extraction and successive bone identification of a small mammal fossil using micro-CT scanning data. The material presented in this study comes from the Malapa cave site, a recently discovered fossil locality in the Cradle of Humankind.

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