tropical to warm temperate palaeoenvironments, principally in Laurussia and the northern continental blocks. By contrast, the Waterloo Farm Lagerstätte, from which *Archaeopteris notosaria* was described, was situated in southern Gondwana at high palaeolatitude (currently reconstructed as being within the Devonian Antarctic Circle). This was the first evidence that cosmopolitan lowland forests had achieved a truly global distribution by the end of the Devonian. The environmental implications of this vegetative explosion have been explored by subsequent authors, particularly with regard to climate change and possible causes of the End Devonian Mass Extinction. The original description relied on portions of leafy 'fronds', and a single poorly preserved fertile fragment. New material has been provided by excavation of a stratigraphically lower site discovered during roadworks in the mid portion of the Witpoort Formation. Not only does this provide a slightly earlier record for the arrival of *Archaeopteris* in southern Africa but is also significant in that the new material provides additional anatomical information. It includes impressions of two whole 'fronds', one infertile and one fertile, as well as a fragment in which the structure of the fertile cones is clearly apparent, revealing the type material to have been incomplete.

Bone lesion in a gorgonopsian fossil from the Permian of Zambia: periosteal reaction in a premammalian synapsid

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Gorgonopsians are an iconic group of sabre-toothed synapsids that were only distantly related to mammals, and were among the dominant terrestrial predators during the late Permian (*c.* ~260–252 million years ago). Whereas their external morphology has shed light on their evolutionary relationships and the origins of classic 'mammal-like' anatomical traits, surprisingly little else is known of their palaeobiology, including their behaviour and physiology. Study of an extraordinary bone lesion hence provides insights into the role of gorgonopsians in reconstructing the palaeobiological context in which the diversity of mammalian healing responses emerged. Here, we describe the first nonmalignant lesion in the forelimb of a large gorgonopid from the upper Permian Madumabisa Mudstone (Luangwa Basin, Zambia). High-resolution X-ray computed tomography and histological sectioning permit detailed description and analysis of the lesion and its healing response. The solitary lesion is localized on the anterodorsal edge of the radius shaft. The reactive bone is a thickened, disorganized layer comprising a homogenous meshwork of fine cancellous bony spicules with few radial spicules. Distally, near the metaphysis, there is some internal remodelling of perimedullary bone. The lesion was 'finished' by a dense layer of poorly vascularized periosteal bone during final phases of healing. However, evidence of infection, pyogenic abscess, or malignancy is lacking. Periosteal reactions have a range of differential diagnoses, including trauma, infection, and malignancy. We suggest this instance of periostosis could be attributed to a post-traumatic subperiosteal haematoma ('bone bruise'). The rapidity of the healing response – evidenced by its disorganized texture and localization to a single growth period – is unexpected for an ectotherm, but such haematomas are occasionally documented in surveys of extant reptiles (crocodylids, varanids). This report adds to a list of putative disease entities recognized in early synapsids, broadening comparative baselines for the evolution of pathologies in the forebears of mammals and in tetrapods more broadly.

A microtomographic study of the StW 669 hominin molar from Milner Hall, Sterkfontein, South Africa

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The Sterkfontein Caves, South Africa are one of the richest hominin fossil-bearing sites in the world. Fossil hominin remains from Sterkfontein have been attributed to the genera *Paranthropus*, *Australo-*

pithecus and *Homo*. Recent excavations have revealed the potential of the Milner Hall locality to contribute to the Sterkfontein hominin fossil record through the discovery of one upper right molar (StW 669). The description and metrical analyses of this specimen suggests an enigmatic mix of primitive and derived morphological traits. StW 669 combines quantitative and qualitative similarities with the first upper molars of *Homo*. However, for now, the taxonomic status of StW 669 remains uncertain. Micro computed tomography allows the accurate visualization and analysis of internal dental surfaces. Tissue proportions, enamel thickness and the morphology of the enamel–dentine junction (EDJ) are key features in hominid evolution and the internal morphology of molars has been successfully used to distinguish between hominin taxa. The stratigraphy of Milner Hall is complex and StW 669 was excavated from the STK-MH1 site in Milner Hall from the T1 deposit, which consists of a mixture of Member 2 and Member 5 Oldowan sediments. Within deposit T1 we could potentially find *Australopithecus*, *Paranthropus* and/or *Homo*. The aim of this project is to clarify the taxonomic attribution of StW 669 by analysing its tissue proportions, enamel thickness and morphology of the EDJ in conjunction with comparisons to previously reported data.

New Triassic–Jurassic (Upper Karoo Group) fossil localities on the margin of Lake Kariba, Zimbabwe

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A collaborative field project in 2017 and 2018 between the National Museums and Monuments of Zimbabwe, the University of the Witwatersrand, and the Natural History Museum, London resulted in the first systematic palaeontological and stratigraphic review of the southern margin of Lake Kariba, Zimbabwe in over 40 years. We identified nine new fossiliferous sites that harbour the potential to reveal new insights into the biodiversity of Gondwana during the Triassic–Jurassic interval. Investigations into the Pebbly Arkose unit of the Tashinga Formation (Bumi Hills, Matusadona Lake Shore, Musango, Spurwing Island) and Forest Sandstone (Namembere, 126/127, and other Sibilobilo islands) identified typical early dinosaurian faunas consisting largely of sauropodomorphs. However, in the lower Pebbly Arkose, dinosaurs are absent and instead a largely aquatic vertebrate assemblage is present, which includes the first known phytosaur material from sub-Saharan Africa and a rich fossil wood flora (various sites in Matusadona National Park various sites in Matusadona National Park and the Omay Communal Land). Stratigraphic and palaeontological data gathered on this trip provide new evidence of how the sediments within the Mid-Zambezi Basin correlate with those in the main Karoo Basin, and more broadly with other Upper Triassic and Lower Jurassic strata. It also potentially provides insights into climate belt shifts across the Triassic–Jurassic Boundary, which may have acted as a biogeographic barrier for some vertebrate taxa.

The phylogenetic classification and locomotion of a non-mammaliaform cynodont *Lumkuia fuzzi* (Probainognathia, Cynodontia) based on CT-tomography of the postcranial skeleton

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Lumkuia fuzzi is a small-bodied non-mammaliaform cynodont from the South African early Middle Triassic *Cynognathius* Assemblage Zone of the Karoo Supergroup. It is known by only one specimen,