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PRELIMINARY REPORT OF DINOSAUR TRACKS IN QWA QWA, SOUTH AFRICA.

by

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ABSTRACT

We record the presence of tridactyl dinosaur tracks preserved on a siltstone surface in a watercourse in a north eastern Free State game park.

KEYWORDS: Early Jurassic, Elliot Formation, theropod dinosaur, tracks.

INTRODUCTION

Olsen and Galton (1984) reviewed the vertebrate tracks of the Stormberg group of southern Africa (most of them erected by Paul Ellenberger and co-workers during the 'sixties and early 'seventies). They recognised eight ichno-genera, all from the Elliot and Clarens formations, placing all three-toed, bipedal tracks in the ichnogenus *Grallator*, which they believe were "almost certainly" made by theropods: this leaves the small bipedal ornithopods out of consideration. Raath (1972) described tridactyl dinosaur tracks from the then Southern Rhodesia (now Zimbabwe) and attributed them to the theropod *Syntarsus* (Raath 1969). Raath *et al.* (1990) described tridactyl dinosaur tracks from the Molteno Formation which lies at the base of the Stormberg (apart from one small fish the Molteno has yielded no vertebrate fossils); they attributed these to an unknown theropod and suggested that these are the oldest dinosaur tracks in southern Africa. However, these tracks are twice as large as those reported here.

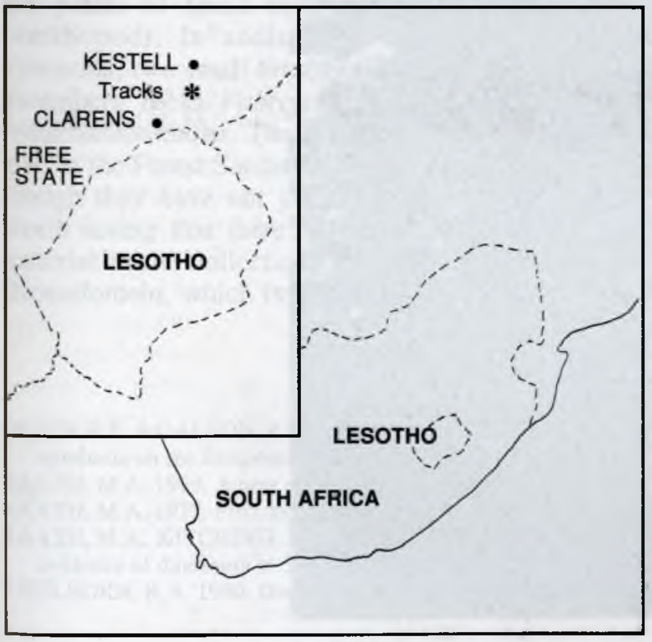

Figure 1. Location of the track site described in this note.

While planning the route for a student field excursion in July 1996, we were shown a superb set of small tridactyl dinosaur tracks in what are probably basal Elliot Formation rocks on the farm Tweedegeluk, in the Qwa Qwa district, north eastern Free State Province (Figure 1). These prints are at an open, level section of an otherwise steep-sided drainage gully where a vehicle track crosses, so they get ridden over by off-road vehicles, albeit infrequently. They also become silted over at times. Ideally a latex impression should be made, and a low wall should be erected at the site to divert storm water.

GEOLGICAL SETTING (Figure 2)

Lack of outcrop makes it difficult to decide whether the tracks are in Molteno or lowermost Elliot rocks. However, in the erosion gully above the tracks all the exposed sediments are fine grained, as is typical of the Elliot. The tracks are either immediately above, or perhaps within, an unusual, locally prominent and easily recognisable, sandstone 'sandwich' with a thick, olive gray, finer grained and more deeply weathered 'filling', representing rapid transition from fining-upward to coarsening-upward episodes. This unusual sandstone sequence lies above the uppermost coarse-grained sandstone with distinctive secondary quartz overgrowths typical of the Molteno Formation, and separated from it by a narrow band of soft weathering fine sediments. According to G.H. Groenewald (pers. comm.), the Molteno Formation is only some 20 metres thick in this area.

DESCRIPTION

Roughly 12 metres of track-bearing pavement are exposed on a gently dipping mud-draped bedding plane of overbank siltstone (Figure 3). Tracks are oriented in two directions along a shallow pond margin, and appear to have been made by one or at most two animals. The tridactyl prints average 8 cm long, with a pace of roughly 20 cm and a stride of 40 cm. Prints were

Figure 2. Students examining the track bearing pavement. Clarens Formation sandstone in the distance. Invasive exotic plants choke the gullies.

Figure 3. Close up view of the palaeosurface seen in Figure 1. The tracks with a geological hammer for scale.

Figure 4. The tridactyl print above the sharp end of the hammer has a worm trail (*Planolites*) superimposed on it.

impressed in soft, saturated mud, such that some of the disturbed sediment fell back into the prints, diffusing the outlines of the toe prints and causing the toes to appear a little wider than they should be. We could find only one short drag mark, and this was more likely made by the middle toe of a partially raised foot, than by a tail.

Other features on the surface include oscillation ripple marks such as are typically left by receding water, and feeding traces of annelid worms, some of the latter superimposed on the dinosaur prints (Figure 4).

THE TRACK MAKERS

Thulborn (1990, p.219) notes that with less than perfect pes prints it is often not possible to distinguish the prints of small theropods and small bipedal ornithopods. In addition to the small theropod *Syntarsus*, two small ornithopod genera are present in Stormberg rocks *Fabrosaurus (Lesothosaurus)* and *Heterodontosaurus*. These may very well be present also in the Forest Sandstone Formation of Zimbabwe, though they have not yet been recorded there. It is worth noting that there is undescribed 'fabrosaurid' material in the collections of the National Museum, Bloemfontein, which is considerably larger than any already described, in fact of an ideal size to have made the prints described by Raath *et al.* (1990).

Our inclination to discount ornithopods in the present case is prompted by the inferred behaviour of the track makers. We suggest these were small theropod dinosaurs, quite likely *Syntarsus* (Raath 1969), moving back and forth parallel to the shore at a leisurely pace, perhaps searching for small vertebrates, similar to the behaviour of modern herons. It could be well worth exposing more of the tracks to try to establish the identity of the track maker.

This record is interesting as the lower Elliot typically yields bones of large animals only: the prosauropod *Euskelosaurus*, the cynodont *Scalenodontoides*, 'rauisuchid' fragments and large amphibians; whereas *Syntarsus*, the only known small theropod, is uncommon and, like the small ornithopods, occurs only in the middle and upper Elliot. These tracks therefore possibly indicate an older extension to the stratigraphic range of *Syntarsus* and or ornithopods.

ACKNOWLEDGEMENTS

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