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AN ENIGMATIC NEW REPTILE FROM THE LOWER TRIASSIC FREMOUW FORMATION OF ANTARCTICA

by

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ABSTRACT

The partial skull of a new reptile from the Lower Triassic of Antarctica is described: It has a distinctive *procolophon*-like dentition, but other features suggest it is a diapsid. The name *Fremouwsaurus geludens* is proposed for the new animal. It is not possible to place the new form in any known higher taxon, so it is necessary to establish a new Family Fremouwsauridae to receive it.

INTRODUCTION

The Fremouw Formation of Antarctica contains a fossil tetrapod fauna typical of the well known *Lystrosaurus* zone of the South African Karoo, in addition it has yielded an abundance of small "prolacertid eosuchians" (Kitching *et al.* 1972). Our knowledge of the radiation of diapsid reptiles in the Lower Triassic is scanty. Postcranial material, especially at this stage of our knowledge, is of little use.

In 1970 Kitching collected a tiny fragment of grey/green siltstone (40mm x 20mm x 5mm) containing a mixture of white bone and impressions of bone and teeth of a small reptile on an exposure of the Fremouw Formation known as Kitching Ridge (see map in Kitching *et al.* 1972). This little specimen recently came to the author's attention.

MATERIAL

The specimen BP/1/5296 consists of part of the right side of a small skull and lower jaw which would have been approximately 30mm long when complete. The state of the dentition suggests that this was a mature individual. Part of the reason the specimen survived the rigours of the Antarctic climate is that several, mostly indeterminate, postcranial elements lie against the lateral surface of the skull, thus helping to bind the rock together. Preservation is remarkably good, and even the sclerotic ring is preserved. Little mechanical preparation was possible and latex peels were used in the study of the specimen.

SYSTEMATIC PALAEONTOLOGY

Class Reptilia

Subclass Diapsida

Order *incertae sedis*

FREMOUWSAURIDAE fam. nov

Diagnosis: Small diapsid reptile lacking a lower temporal bar but with a backwardly directed jugal spur. Surangular with distinctive crescentic lateral profile. Some sculpting of the lateral surface of the dentary. Dentition heterodont and acrodont with fine, delicate incisiform teeth and large bulbous cheek teeth with linguo-labially broadened crowns which met during occlusion resulting in the formation of wear facets.

Fremouwsaurus gen. nov.

Diagnosis: As for family.
Type species: *Fremouwsaurus geludens* gen. et sp. nov.
Etymology: : After the lower Triassic Antarctic Fremouw Formation from which the specimen was collected.

Fremouwsaurus geludens gen. sp. nov.

Diagnosis: As for genus and family.
Etymology: name from the Latin gelu = frost and dens = teeth : this name is suggested because of the remarkable resemblance of the cheek teeth to blobs of decorative frosting on a cake.
Holotype: BP/1/5296. Partial skull and lower jaw and some fragments of postcranial skeleton. In the collections of the Bernard Price Institute for Palaeontological Research.
Geological Horison: Fremouw Formation
Type horizon and locality: Kitching Ridge, antarctica.

DESCRIPTION

The skull roof is missing. Most of the prefrontal and maxilla, as well as a normally developed lacrimal, are preserved either as bone or impression. An apparently natural edge on the maxilla may indicate the suture with the premaxilla. The lower two thirds of the orbital border and scleral ring are preserved.

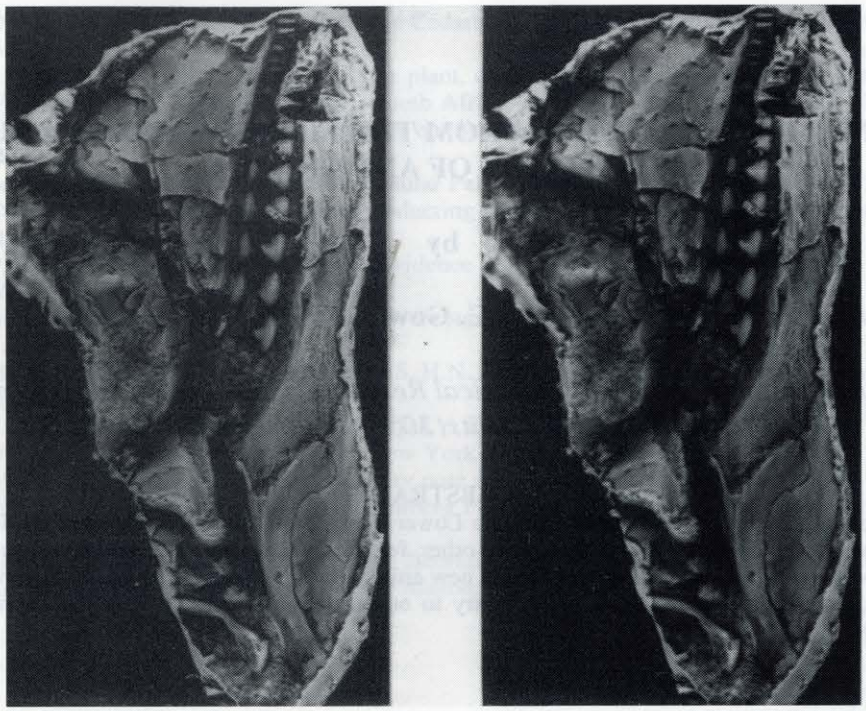

Figure 1: *Fremouwsaurus geludens* – stereophotographs of a latex peel taken from the specimen

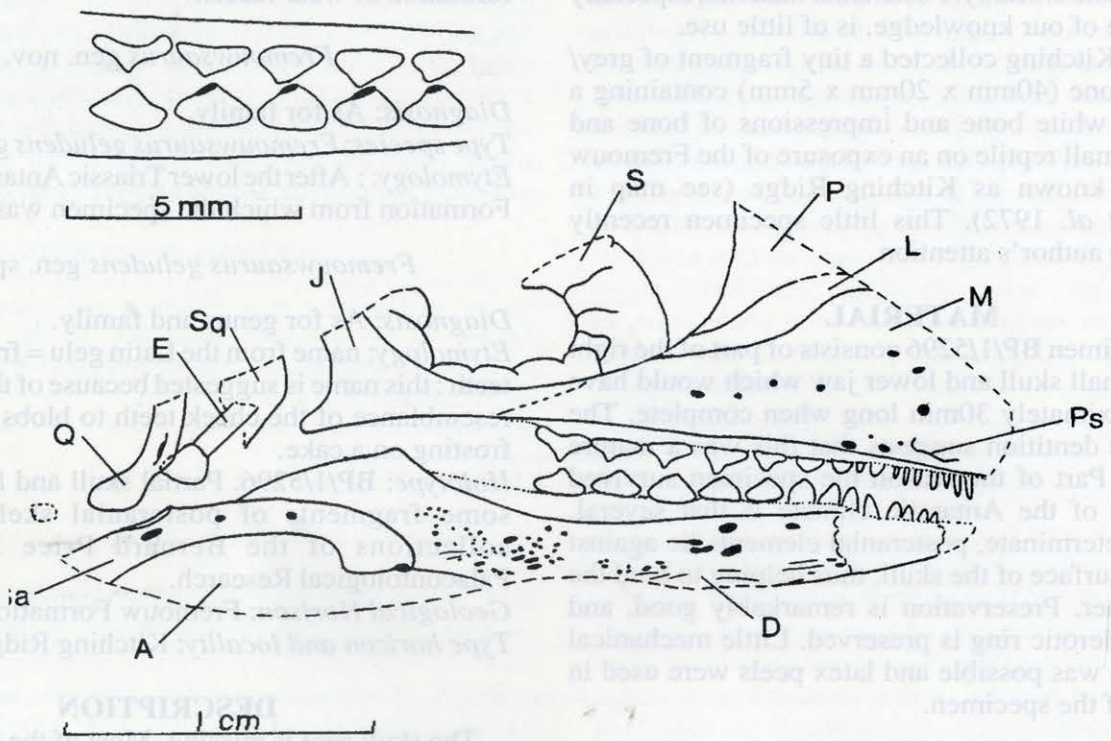

Figure 2: *Fremouwsaurus geludens* expanatory sketch with inset detail of the wear facets and pattern of occlusion of the cheek teeth.
A – angular; P – prefrontal; D – dentary; Ps – suture between premaxilla and maxilla; E – epipterygoid; Q – quadrate; J – jugal; s – sclera; L – lacrimal; Sa – surangular; M – maxilla; Sq – squamosal.

Viewing the specimen medially posterior to the orbit, there is a fragment of pterygoid or ectopterygoid in natural association with maxilla and jugal. Only the lower portion of the jugal is preserved: it has a thin posterior edge and a well developed posteroventral spur. Behind this in an unnatural position, lies a bone consisting of a broad flat shaft and a footplate at an oblique angle to the shaft: its identity is uncertain, but it may be epipterygoid. Lateral to this epipterygoid is a partially exposed sheet of bone which is probably squamosal. Behind this is an excellent impression in lateral profile of a tall strongly bowed quadrate with a deep depression on its posterior (occipital) surface.

The lower jaw has suffered only minor loss at both ends. The lateral surface of the dentary is decorated with ridges and pits. A small coronoid eminence is present. Lateral sutures are well displayed and the surangular has a distinctive crescentic shape.

The remarkable dentition is almost entirely preserved as impression. Most remarkable is the size disparity between the fine anterior teeth and the massive posterior cheek teeth. Tooth attachment is acrodont. A fully formed posterior maxillary tooth is broken in the mesiodistal plane with the labial half of the tooth preserved, this tooth had not yet become attached to the maxilla. The large cheek teeth have linguolabially broadened crowns and a precise occlusal relationship whereby, as the jaws closed, the distal slopes of the lower crowns came into contact with the mesial slopes of the uppers. The resulting wear facets are clearly visible on the lower teeth, but not enough of the uppers is preserved to display the corresponding wear facets.

DISCUSSION

At first sight this little skull has a procolophonid look about it, due to the morphology and mode of attachment of the teeth and the short snout. However, no known procolophonid exhibits such a marked size difference between incisiform amd molariform teeth, and the short snout is a function of the relatively large orbits in skulls of this size. The shape of the posterior edge of the jugal is entirely atypical of this bone in procolophonids; some, such as *Owenetta* and *Procolophon* (Gow 1977) have an upswept jugal, but none has a posteroventral jugal spur. It is extremely unlikely that a procolophonid quadratojugal would become separated from the quadrate; the procolophonid quadrate has a vertical lateral profile, and there is no depression in its posterior surface. Finally, amongst the otherwise unhelpful postcranial elements are two tiny bones which are probably phalanges or possibly caudal centra. These bones are long and slender, whereas the corresponding bones of procolophonids are short and broad.

The jugal as preserved is undisturbed and the posteroventral spur was carefully exposed by the writer. There can be little doubt that this morphology represents a reduction from an ancestral condition in which a lower temporal bar was present. This condition is typical not only of lizards, but also prolacertids (Gow 1975) and some sphenodontids (Carroll 1987). The quadrate is indistinguishable from that of diapsids such as *Prolacerta* (Gow 1975). It is thus very likely that this new form is a diapsid. That it is not a sphenodontid, as the acrodont dentition might suggest, is demonstrated by the presence of a lacrimal bone. Known prolacertids are all carnivorous. There are no characters which would place the specimen unequivocally in lepidosauria and there are no known herbivorous Triassic lepidosaurs. The specimen is best regarded as representative of a previously unrecorded, in all likelihood diapsid, family.

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