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A QUASI-MAMMAL FROM LESOTHO

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The specimen described in this paper was discovered by the University College Expedition to Lesotho in 1968. It consists of most of the right maxilla. It contains the root of a large canine followed by an edentulous area which may contain the roots of one or more premolariform teeth. Posterior to this there is evidence of five molariform teeth. The most distal of these is probably the last molar. The molariform teeth are single rooted, while their crowns, although essentially single-cusped, have some resemblance to those of small contemporaneous true mammals of the family Morganucodontidae. The affinities of this animal are discussed in the paper, and it is suggested that there was an extensive fauna of small animals in the latest Triassic and earliest Jurassic, which although reptiles, had close affinities with the early mammals.

Key words: Therapsida, Morganucodontidae, quasi-mammals, Triassic, Jurassic, dentition, teeth, Lesotho.

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The specimen which forms the subject of this communication was recovered by the University College, London expedition to Lesotho in 1968. In addition to the more obvious specimens brought back by this expedition, a quantity of apparently fossiliferous matrix was recovered and the specimen was found during routine search of this matrix by Miss Lees, who subsequently prepared it. Since the fragment consisted largely of teeth, it was suggested that Mills should collaborate with her in its description. The specimen described in the present paper is housed in the Department of Zoology, University College, London (abbreviated as UC) and is illustrated in fig. 1 and plate 5.

DESCRIPTION OF MATERIAL

Class ?**Reptilia**

Pattisia gen.n.

Type species: Pattisia likhoelensis sp.n.

Distribution: Known only from a single specimen. Late Triassic, Africa, Lesotho.

Diagnosis: Apparently a late theriodont with some resemblance to early Atherian mammals. Upper maxillary teeth only known. Single canine and about seven post-canine teeth, of which the more mesial appear to resemble premolars in size and to be lost early. The last four or five are molariform with a single cusp and mesial and distal cuspules.

Pattsia likhoelensis sp.n.

(pl 5:1—4; fig. 1)

Type specimen: UC C146; damaged right maxilla with canine and eight post-canine teeth, mostly damaged. Red beds, from upper Stormberg series. S. Africa = Norian. Pl. 5:1—4; fig. 1.

Locality: Slopes of Thaba ea Litau Mountain, Likhoele, Lesotho.

Diagnosis: As for genus.

Derivation of name: To honour Dr. Bryan Patterson, known to his many friends as "Pat". The more obvious "Pattersonia" is preoccupied. The specific name refers to the location where the specimen was collected.

The specimen is broadly contemporaneous with *Megazostrodon* (Crompton and Jenkins 1968) and somewhat earlier in time than *Erythrotherium* (Crompton, 1964). It consists of the major part of a right maxilla in a reasonably good state of preservation. The lateral side of the maxilla is visible and although the bone is broken in places, the fragments do not appear to have been displaced appreciably. There is apparently an infra-orbital foramen lying above the first postcanine. The palate is apparently intact up to the mid-line, for the anterior half of its length. Either the posterior half of the secondary palate is not closed or, more probably, its medial part is broken away.

The total size of the specimen is 12.5 mm×5.2 mm. The teeth are all small and measurements, necessary approximate in view of the damage to most of the teeth, are given in Table 1.

Table 1

Approximate measurements of teeth (in mm)

	Length	Height	Width
C1	1.56	N.A.*	1.16
PC4	0.96	1.16	0.80
PC5	1.52	N.A.	0.80
PC6	1.38	1.18	0.92

* N.A. = not available. As the cusp of the tooth had been broken off, the height could not be measured.

There is some evidence of at least eight upper teeth, although the exact number is not certain. The most anterior tooth present is the upper canine but we cannot say with certainty that there was no tooth anterior to this on the maxilla and the premaxilla is completely absent. The canine is represented only by its root, the crown having been broken off after death. The root has been displaced labially through the thin outer plate of bone and almost certainly rotated through about a right angle. If this is correct, the root is oval in cross-section, being flattened bucco-lingually. It tapered towards its end in the bucco-lingual dimension (that is,

when seen from the mesial aspect) but when seen from the buccal, it is more difficult to assess whether it tapered; if so, comparatively gently.

Immediately behind this canine, the maxilla constricts in a manner typical of the theriodonts. This region appears to be devoid of teeth but careful examination shows what appear to be the roots of one and possibly two single rooted teeth, arranged one behind the other. These are cut off at or just below the alveolar level, leaving a flat root surface, in a manner reminiscent of *Morganucodon* and its near relatives (Mills 1971).

The next tooth, which we will call (without much conviction) PC3 has been severely damaged after death. It consists of a large and roughly circular root, with a pulp chamber. This is broken off irregularly, sometimes above and sometimes below the alveolar surface. The buccal half of the crown was missing but the lingual half was separated from the root and somewhat rotated, so that the distal half of its lingual surface was applied to the mesio-buccal surface of PC4. The tooth was apparently dominated by a single large cusp, similar to its posterior neighbour, with an almost vertical lingual surface. This unlike the most posterior teeth, apparently had a very narrow lingual cingulum or ridge, close to the alveolar border, on at least its mesial half. It is shown in fig. 1 but was removed to allow access to PC4 before the photographs in plate 5 were prepared.

PC4 is the first reasonably intact tooth, visible from all surfaces. It, and the succeeding two teeth, are shown in pl. 5:2 and 5:3. The crown is dominated by a single large cusp, the tip of which is in the centre of the crown, mesio-distally but almost level with its lingual margin. The lingual surface is almost flat—actually slightly convex—and almost vertical. There is no lingual cingulum. Sharp crests run directly mesially and distally from the tip of main cusp to end in mesial and distal cuspules. While both of these cuspules appear from the lingual side to be diminutive, the mesial is the larger.

On their buccal sides, these cuspules form the ends of a crenulated cingulum which extends around the whole buccal margin of the tooth. Commencing from the distal cuspule, it runs at first directly buccally, then curves around the buccal side to run again directly mesially into the mesial cuspule. Apart from this cingulum, which varies somewhat in width, the buccal surface of the tooth is devoid of any features and is convex, especially from mesial to distal. The crown has its greater diameter from buccal to lingual.

The tooth apparently has a single root, exposed on its buccal side for a length equal to the height of the main cusp. This does not reach the end of the root, which appears to dilate slightly as one passes towards its end. In the part which is visible, there is no sign of the root dividing, and it seems reasonably certain that this does not occur.

PC5 has been damaged, the fracture line running from buccal to lingual, with the more distal part displaced buccally relative to the more mesial. The main cusp is also broken off not far from its base; it was again apparently a stout cusp. The lingual surface was flat and devoid of cingulum. The tooth was longer than wide (unlike PC4) and more molariform than the latter tooth, so that it is tempting to regard it as M1, although there is no real evidence to support this. In general, the tooth seems to have resembled its distal neighbour. It is of the same general plan as its mesial neighbour except that it is elongated mesio-distally. It apparently had a similar crenulated cingulum and its root, although flattened bucco-lingually, was similarly undivided.

PC6. This follows the general shape of the more anterior teeth. The main cusp is stout and is intact, apart from its tip, which is broken off. It is again molariform, being longer than it is wide. The lingual surface is again almost flat and vertical. The mesial cuspule is somewhat stouter than the distal, although the latter is

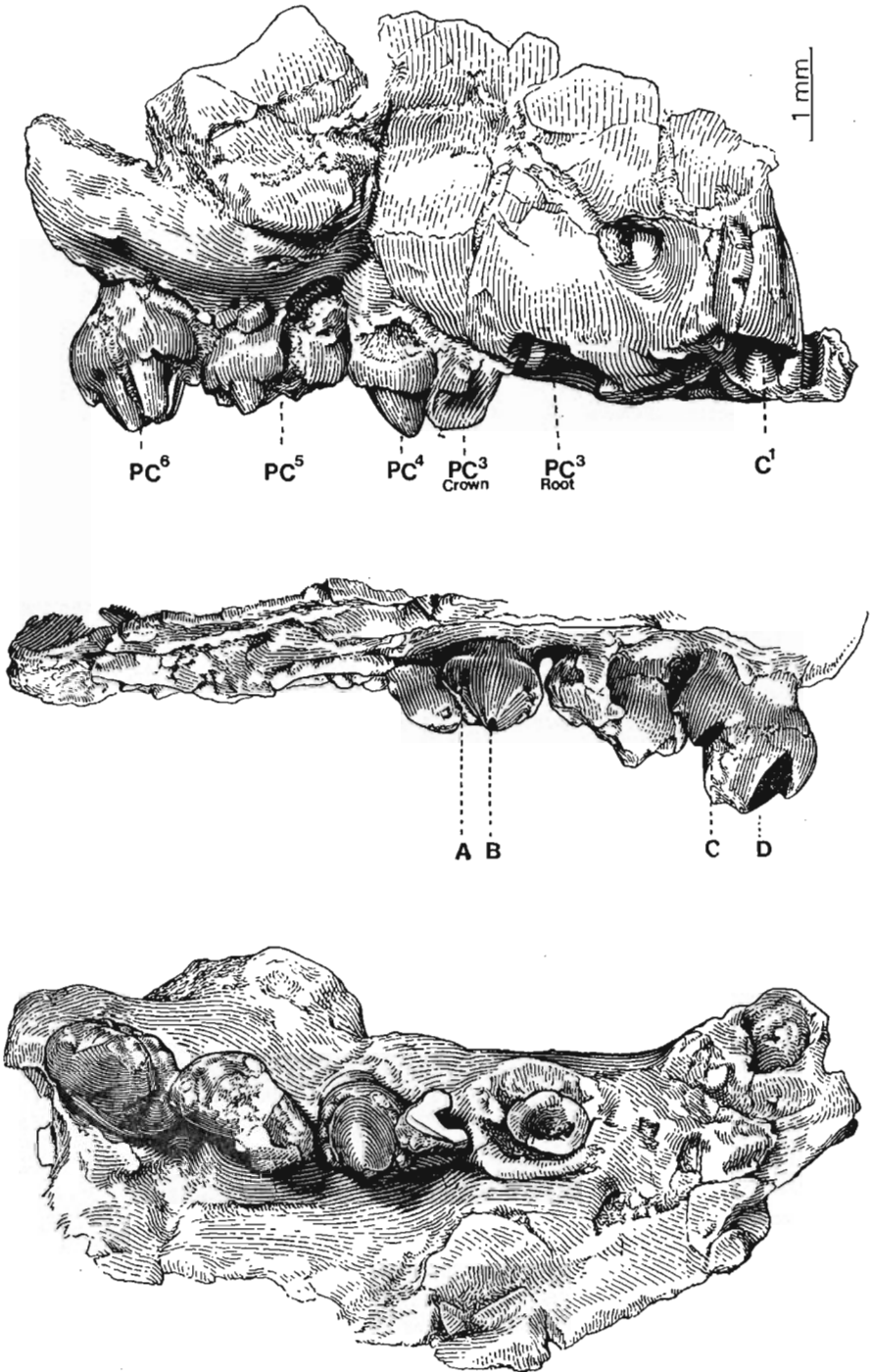


Fig. 1. *Patsia likhoelensis* sp.n. UC C146; Uppermost Triassic, Likhoele, Lesoto. A (upper) — buccal aspect, B (middle) — lingual aspect, to show wear facets, C (lower) — occlusal aspect.

slightly the higher. The buccal cingulum extends between these two cusps and is definitely crenulated. It is widest towards its mesial end and narrowest opposite the buccal side of the main cusp. As with all the molariform teeth, the buccal surface is convex and when viewed from above (or rather, since it is an upper tooth, from below) the outline takes the form of an isosceles triangle, with its apex buccally and with all sides and angles rounded (fig. 1C). There is again no evidence of a cingulum on the lingual aspect, although a small part of the appropriate surface is missing.

The root is again exposed over a length almost equal to the height of the main cusp. It is undivided and probably dilates very slightly towards its end. Like the crown, it is flattened bucco-lingually.

PC7 (pl. 5:4) originally lay behind and above PC6 and was apparently unerupted at the time of death. It had no root, apparently because it had not yet formed, rather than due to later loss. It was exposed from the lingual side and quite unworn and undamaged. The crown was tricuspid, with the central cusp still definitely the largest but with the mesial and distal cusps relatively larger than on the more anterior teeth. Although it resembled PC5 and 6 rather than PC4, it was smaller than these teeth and may well have been the final tooth.

Since this was the only completely intact tooth, it was felt desirable to separate the tooth from matrix, in order to examine the buccal surface. After photographing, an attempt was therefore made to lift the tooth from the matrix, but this unfortunately failed and the tooth was lost.

The tooth row. The postcanine teeth appear to be arranged roughly in line but with a tendency for PC5 and 6 each to overlap their more mesial neighbours buccally, so that they were set very slightly obliquely in the bone. The mesial of each of these teeth also apparently lies below the distal cingulum of its neighbour (making, in both cases, some allowance for slight displacement of PC4). The contact points between the more anterior postcanines may well have been similar—damage prevents an assessment. This contact point arrangement is similar to that seen in *Morganucodon* and this tight arrangement of the contact points is usually regarded as a mammalian feature and at least indicative of limited tooth replacement. Also reminiscent of *Morganucodon* is the fact that the upper teeth all lean lingually to a marked extent; a characteristic of the Atheria generally.

Wear on the teeth. This animal apparently had single-rooted "molars" and therefore, in the absence of any other evidence, we must assume it to be a reptile. The unerupted final molar would indicate that it is to some extent immature. It is therefore not surprising that the teeth, although weathered, are almost unworn by use. It is perhaps, more surprising that there is some evidence of wear (fig. 1B).

The most anterior tooth on which wear is visible is PC3; the first reasonably intact tooth. On the lingual surface of the mesial cuspule—rather towards its distal side—is a small but definite wear facet, facet A. On the tip of the main cusp is a very small facet, facet B. This is the only tooth in which the tip of the main cusp is intact but there seems little doubt that the wear is genuinely functional in origin. PC5 is too damaged for wear to be visible. PC6 shows the best evidence of wear of any tooth. There is again a small but well-worn facet on the distal aspect of the lingual side of the anterior cuspule. There is a larger but less well-marked wear facet on the more distal half of the lingual surface of this tooth, lying on each side of the shallow groove between the main and distal cusps. This groove is very shallow and the wear facet lies essentially in one plate, giving the appearance of another flat surface shearing against this flat surface, rather than a developed cusp shearing down a groove. This facet is only slightly worn and wear may be the result of abrasion rather than attrition. The final postcanine showed no wear and, as previously mentioned, was probably unerupted at the time of death.

It would be difficult, from such trivial evidence to predict the nature of the lower teeth or the pattern of chewing, insofar as such existed. The following comments are produced largely by extrapolation from Atherian mammals and especially from *Morganucodon* and from a hypothetical condition shown in fig. 3B of Mills (1971). It seems probable that the lower molars were also single-cusped, with additional minor cuspules. The main point to be made is to suggest that the facets between the main upper cusp and the mesial cuspule of PCs 3 and 5 (Facets A and C) were produced by the principal cusp of the lower molar, while the wear on the tip of the upper main cusp of PC3 (Facet B) was similarly produced by this cusp shearing down the groove between the principal lower cusp and a distal cuspule. The less marked wear on the posterior half of the penultimate upper tooth (Facet D) may be abrasion — that is, non-shearing wear produced by food-tooth contact rather than tooth-tooth contact. If this interpretation is correct, or even if our identification of the lower cusps is mistaken, this would indicate a precision of cusp-in-groove contact at a stage when shearing probably was of little functional importance, since wear is so slight. This is a surprising finding.

AFFINITIES

Thrinaxodon liorhinus. This is a small cynodont with a simple and unspecialised dentition, of the family Galesauridae from the *Lystrosaurus* zone of the early Triassic. It has the great advantage of being comparatively well-known from a number of prepared skulls, including one in the possession of the University College team, at present undescribed. Crompton and Jenkins (1968) have suggested that it may be close to the line of mammalian evolution. The following comments are based on examination of the University College specimen, and on the published descriptions of Crompton (1972) and from examination of his specimens at the Museum of Comparative Zoology, Harvard University.

The more posterior upper postcanine teeth of *Thrinaxodon* are not unlike those of the present specimen. They have a principal cusp, situated centrally on the crown, with mesial and distal cuspules, the mesial somewhat higher than the distal (as in the animal here described). They differ from the present specimen in that *Thrinaxodon* postcanines have a suggestion of an internal cingulum while apparently there is no external cingulum, although there is considerable variation between the different generations of teeth. The teeth in our specimen had firm contact with their neighbours and there is no evidence of replacement; both differences from *Thrinaxodon* which could indicate nothing more than their differing horizons. Both animals have large canines, probably merely indicating carnivorous habits. The "premolars" of *Pattisia* were probably rather small and possibly lost early in life by cutting off the crown — a fairly common theriodont character (Kermack 1956), but not apparently present in *Thrinaxodon*.

Both *Thrinaxodon* and *Pattisia* have simple, generalized carnivorous dentitions and have a number of points of resemblance. These could well

