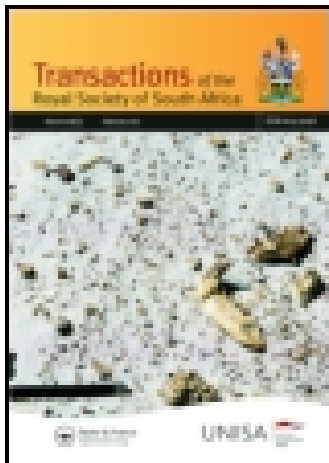


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R. Broom M.D., B.Sc.

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THE LEG AND TOE BONES OF *PTYCHOSIAGUM*.

BY R. BROOM, M.D., B.Sc.

(Read November 28, 1900.)

(Plate XXXII.)

Among a series of geological specimens recently presented by Mr. Leslie, of Port Elizabeth, to the Eastern Province Naturalists' Society was a piece of stone on which were displayed a small tibia and fibula. The specimen had been sent from Colesberg and had been found in association with a fine skull of *Ptychosiagum Murrayi*, now in Mr. Leslie's possession. As the matrix of the specimen is quite similar to that of the skull, and as the peculiarities of the leg bones are such as might be expected from what is known of the other limb bones of *Ptychosiagum*, there does not seem to be any reasonable doubt in referring the bones to the same genus.

In clearing away the matrix from the bones I was fortunate in discovering the greater part of two toes with the bones in apposition, and a couple of carpal bones.

The tibia is almost quite perfect. It is narrow and rounded in the middle, slightly expanded at the proximal end, and greatly expanded at the lower end. Down the front of the upper third of the bone there is a fairly well-marked crest, on the inner side of which the bone is slightly hollowed for the attachment of the tibialis anticus muscle. On the outer side of the upper part of the crest is a small depression, doubtless corresponding to that seen in a similar situation in the tibia of *Ornithorhynchus*. The lower end of the tibia is so greatly expanded that its transverse measurement is quite three times that of the middle of the bone. The tibia has had a large cartilaginous pad on its lower end, so that instead of its showing an articular surface for the astragalus it presents an almost smooth surface to which the cartilaginous pad has been attached. This peculiarity has not been hitherto met with in any of the allied South African forms, and so far as I am aware only occurs in aquatic forms. Among Reptiles a somewhat similar condition is seen in the Pythonomorpha and in Plesiosaurians.

The fibula is unfortunately broken at its lower end, but otherwise is perfect. It is a moderately stout bone, with the lower end apparently only slightly enlarged, but with the upper end much flattened and very greatly expanded. The upper end has articulated with the tibia and probably also with the femur by its inner angle, while the outer part of the upper expanded portion extends considerably above the articular surface. In the large majority of mammals and reptiles the upper end of the fibula is comparatively small, and in the higher mammals it only articulates with the tibia. In the Marsupials and the Monotremes the fibula usually has an expanded head and articulates with the femur as well as with the tibia. In *Dasyurus* the fibula is but little expanded at its upper end, but in the nearly allied *Didelphys* the expansion is considerable, and in some Marsupials the expansion is very great. The greatest degree of expansion I have observed is in the large flying Phalanger (*Petauroides volans*) (Fig. 3). In both the Monotremes the expansion is well marked, and in *Ornithorhynchus* is very peculiarly developed. In *Oudenodon* and *Dicynodon* there is some degree of expansion of the upper end of the fibula, but it is less marked than in *Ptychosiaugum*.

The two toes were found lying side by side and one has been cleared so as to show the under surface, the other the upper. Of the one the metatarsal and two phalanges were found; of the other the three phalanges. Fig. 10 Pl. xxxii. represents the upper surface of what is probably the third toe of the left foot. Fig. 6 shows the under surface of what is probably the fourth toe of the same foot.

The metatarsal bone is an irregular rhomboidal bone almost as broad as it is long. Each side and the under surface are considerably hollowed out, while the upper surface is only slightly concave. The articular surfaces, like that of the lower end of the tibia, have been padded with cartilage. The first phalanx in both the third and fourth toes is a very short but broad bone, being about twice as broad as it is long. It apparently to a slight extent overlaps the second phalanx. The second phalanx is about as long as it is broad. Its distal end has a well-marked articular head for the ungual phalanx. The ungual phalanx is well preserved in the third toe. It is a broad, flattened bone, which is only slightly curved. It must have supported a large and powerful claw, though a moderately flat one. The general proportions of the bones of the toes are closely paralleled by those in some of the toes of *Echidna*. Fig. 8 represents the second toe of the right foot of *Echidna* and shows a similar shortening of the first phalanx

and a very marked resemblance in the structure of the claw. Among the Edentates the first phalanx is similarly shortened in certain toes of the Armadillo and the Sloth. In *Oudenodon* and *Dicynodon*, so far as is known, the phalanges are all well developed. In those toes of *Cynodraco* which I have recently discovered the phalanges are likewise all well developed.

From the position of the nostrils in *Ptychosiagum* one would naturally conclude that it had been an aquatic form, and the structure of the leg and toes confirms this view.

EXPLANATION OF PLATE XXXII.

FIG.

1. Front view of tibia of *Ptychosiagum Murrayi*.
2. Outer view of tibia and fibula of *Ptychosiagum Murrayi*.
3. " " " *Petauroides volans*.
4. " " " *Echidna aculeata*.
5. " " " *Ornithorhynchus anatinus*.
6. Under surface of fourth (? third) toe of *Ptychosiagum Murrayi*.
7. Side view " " " " "
8. Upper surface of second toe of right foot of *Echidna aculeata*.
9. Upper surface of fourth (? third) metatarsal of *Ptychosiagum Murrayi*.
10. Upper surface of third (? second) toe of *Ptychosiagum Murrayi*.
11. Side view of ungual phalanx of third (? second) toe of *P. Murrayi*.
12. Articular surface of ungual phalanx of " "