surface is embedded in the tendon. The synovial cavity is usually an extension of the cavity of the neighbouring joint, but may be (for example, peroneus longus) a part of a synovial bursa. Sesamoids appear first as mesenchymal condensations of the tissues between the developing tendons and prominences[4]; the deeper parts are always developed in cartilage, but the part embedded in the muscle may be formed of calcified tendon substance later replaced by lamellar bone. Historically, sesamoids are unknown in all carboniferous and Permian animals, and have never been developed in the lines leading to the modern urodeles, turtles, crocodiles or Sphenodon, but have been developed by independent evolution in several other groups[5].

The essential factor for the development of a sesamoid is the pressure of a bony prominence, so that the tendon is exposed to lateral pressure at the same time as it is stretched. Some sesamoids may increase the leverage of muscles, but their removal does not greatly affect muscular power. Probably they are concerned rather with the maintenance of the vascular supply of the tendon in the region where the blood vessels would otherwise be liable to prolonged occlusion by lateral pressure. In this they are analogous to the ossified tendons found in several dinosaurs, birds and kangaroos[6].

Sesamoids can usually be recognized from their positions and relationships, but sometimes special criteria must be used. The pisiform does not articulate with a single bony prominence in most animals, but fills the gap between the ulna and ulnare; and even when, with increasing freedom of ulnar deviation at the wrist it comes to articulate with the ulnare (triquetral) alone, it does not glide over this bone as a sesamoid should, and its synovial cavity is a separate formation. It is, as many authors have indicated, constantly present in all early reptiles and is indicated in the amphibian Eryops and so cannot be a sesamoid[7,8]. The patella, on the other hand, to take another bone the morphology of which has been questioned, is a sesamoid because it has the typical structure, position and relationships, it is exposed to pressure as it turns over the lower end of the femur, and it is not developed in primitive tetrapods. Harris's criterion, the presence of a secondary centre, already discussed at length by Sieglbauer[3], is of doubtful value in recent forms, and is useless in early forms as no secondary centres appear before the Triassic.

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IN a recent letter in *Nature*, Prof. Harris[1] gave radiological evidence for the appearance of a separate epiphysial centre in the pisiform bone of sub-human primates. In view of the considerable theoretical importance which he attached to this finding, further observations have been made in this Department. A number of female Rhesus monkeys of accurately known age were available for X-ray study. The result of this investigation has been a smooth and continuous record of the developing pisiform bone in the macaque monkey from birth to maturity.

Examination of the individual films shows that in the female macaque the centre for the body of the pisiform is already present at birth. It is well marked at the age of four months and has attained almost adult size and shape at 16½ months, at which age, however, there is no trace yet of a secondary, epiphysial centre. But the latter is clearly present at the 20½ months, 22½ months stage and still later, at 36 months, although by that time the thickness of the epiphysial cartilage appears much reduced. At the age of six years the Rhesus monkey no longer possesses a radiologically demonstrable epiphysis, and fusion must have taken place during the intervening time.

Thus the existence of a separate epiphysial centre in the pisiform of macaques has been amply confirmed. In addition, the 'life-span' of this centre has now been more clearly defined for, as shown above, it makes its first appearance between the ages of 16½ and 20½ months and fuses with the main centre between three and six years.

Many workers in the past have studied the morphological significance of the pisiform bone, but the literature shows that no uniformity of opinion has yet been reached. The view that it corresponds either to the whole of the os calcis or only to its tubercular part has been expressed before, mainly by the older school of comparative anatomists such as Lavocat[2], Albrecht[3], Baur[4], von Bardeleben[5] and, more specifically, by Ed. Retterer[6]. This worker, after demonstrating the existence of two separate bony centres for the pisiform of the rabbit, cat and dog, concluded in 1898: "Ce mode de développement et la texture du pisiforme adulte m'ont porté à considérer ce segment comme un os long ou au moins comme l'homologue du calcanéum".

Now that the primates can be added to the list of species possessing a separate bony epiphysis, this view seems to be much strengthened.

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I am most indebted to my two former colleagues for pointing out the previous descriptions of the epiphysis in the pisiform bone by Retterer and Sieglbauer. I had previously consulted several anatomists on this point, but without success. *Magna est veritas* . . .

The additional radiographic evidence by my former student Eckstein as to the time of appearance and union of this epiphysial ossification centre in the Rhesus monkey is of great interest. The pisiform, so often dismissed as a minisculum, may yet be of inordinate morphological significance. Haines and Hughes have looked in the library; Eckstein has looked in the monkey!

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