OBSERVATIONS ON THE HEAD OF THE TIBIA.
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THE object of this communication is to show that the form of the tibial head and spine depends largely on the arrangement of the contiguous soft parts.

The spine of the tibia always consists of two eminences placed side by side (a and δ, fig. 1), and separated by an oblique groove which runs backward and outward. Each of these eminences is the portion of the articular surface which is nearest the centre of the head of the tibia; and each, no doubt, rises up here because it corresponds to the intercondylar notch of
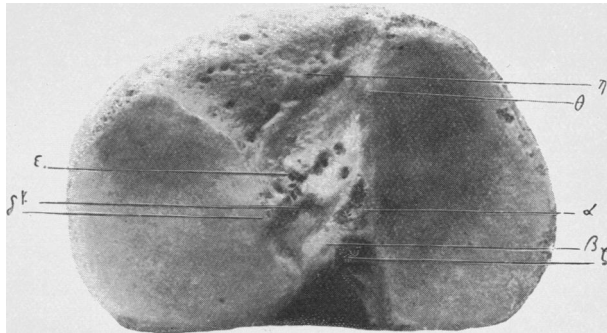

FIG. 1.—Head of left tibia. (¾.)

the femur, for here the head of the tibia is relieved from pressure. As far as the femur is concerned, there is no reason why these eminences should not extend forward and backward as two long ridges, or, indeed, why they should not unite into one long ridge occupying the whole antero-posterior part of the mid-line of the tibial head. On looking at fig. 2, however, it will be seen that the external tubercle is limited anteriorly and posteriorly by the two horns of the external semi-lunar cartilage, while internally the anterior crucial ligament bounds it and lies in the oblique groove separating the two tubercles.

The internal tubercle is not bounded anteriorly and posteriorly by the semi-lunar cartilage, as the outer one is, but by the anterior and posterior crucial ligaments, which in this part of their course are parallel to one

another—their long axes running backward and outward. Owing to this obliquity it is evident that the antero-internal and postero-external parts of the internal tubercle of the spine are not pressed upon, and so this tubercle is prolonged forward and inward by a slight ridge, and backward and outward by a marked, oblique, rounded ridge, which I do not remember seeing described, but which, nevertheless, I believe is always present (β, fig. 1).

In front and behind this oblique ridge lie the anterior and posterior crucial ligaments, and it rises up just where the head of the tibia is relieved from the pressure of these ligaments in extension of the knee.
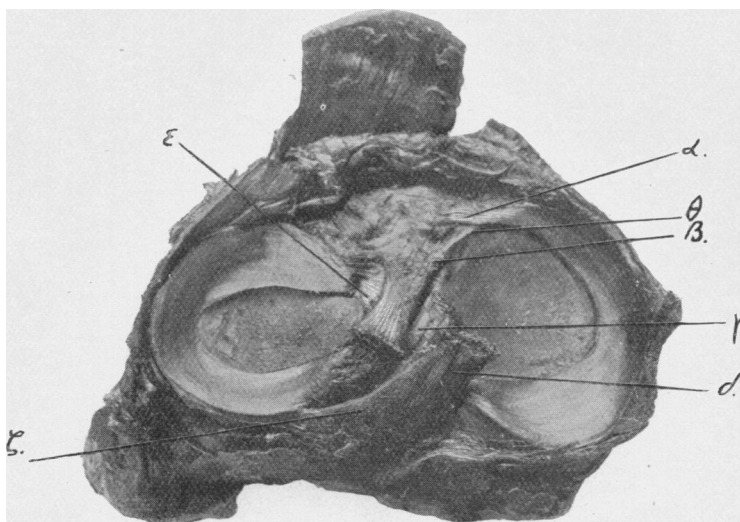

Fig. 2.—Left knee-joint with crucial ligaments *in situ.* ($\frac{3}{4}$.)

Along the summit of this ridge, as far as the internal tubercle, the posterior fibres of the posterior cornu of the external semi-lunar cartilage are attached (fig. 2, γ).

This is better seen when the crucial ligaments are reflected (fig. 3, γ).

On making a sagittal section of the fully extended knee, the ridge, with its superjacent fasciculus of the posterior cornu of the external semi-lunar cartilage, is cut almost transversely (fig. 4, γ), and its relation to the anterior and posterior crucial ligaments (β and δ, fig. 4) is shown.

This section, too, illustrates the amount of force which the posterior crucial ligament must exert in making its oblique groove during full extension of the knee, for it is arched with its convexity upward and backward.

To recapitulate, I should describe the spine of the tibia as consisting of two lateral tubercles, separated by an oblique groove, in the anterior part of which lies the anterior crucial ligament; while the internal tubercle is prolonged backward and outward by an oblique ridge, to which part of the posterior cornu of the external semi-lunar cartilage is attached. In addition to the spine, other bony eminences, marking the other fibrous attachments, may usually be seen if looked for.

The anterior cornu of the external semi-lunar cartilage is attached just in front of a slight oblique ridge (ε, figs. 1, 2, and 3) which runs forward and inward from the outer tubercle, and forms the anterior boundary of the
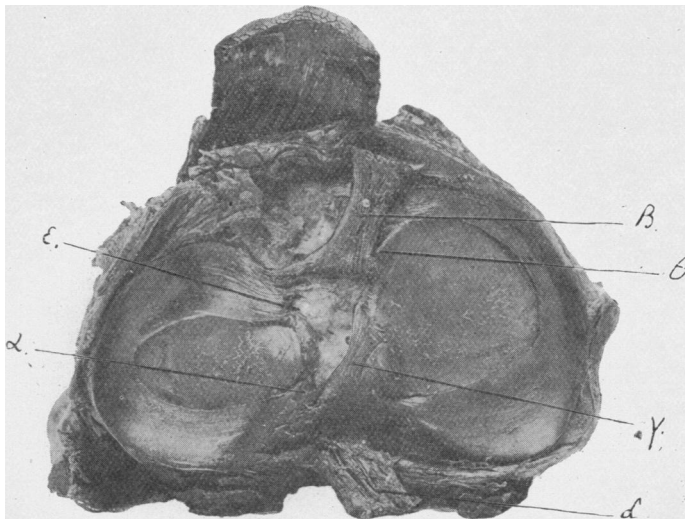

Fig. 3.—Left knee-joint with crucial ligaments turned back.   (¾.)

oblique groove (γ, fig. 1), which may be spoken of as the anterior crucial groove. The specimen (fig. 3) of the soft parts also shows that some of the anterior fibres of this cornu are continued into the outer part of the anterior crucial ligament; but this is well known. The main part of the posterior cornu of the external semi-lunar cartilage (fig. 3, a) is attached just behind a small ridge which runs across the long axis of the anterior crucial groove, dividing it into an anterior part for the anterior crucial ligament, and a posterior part, in which the anterior fibres of the posterior cornu of the external semi-lunar cartilage lie. This ridge is shown just in front of γ in fig. 1, and forms the summit of the anterior crucial groove which slopes downward from it both anteriorly and posteriorly.

The exact posterior attachment of the external semi-lunar cartilage is

therefore at least triple; the anterior fibres (a, fig 3) pass to this ridge in the anterior crucial groove, the more posterior fibres (γ, fig. 3) pass along, and are attached to, the oblique ridge separating the anterior and posterior crucial grooves, while the most posterior fibres of all (ζ, fig. 2) run up to the
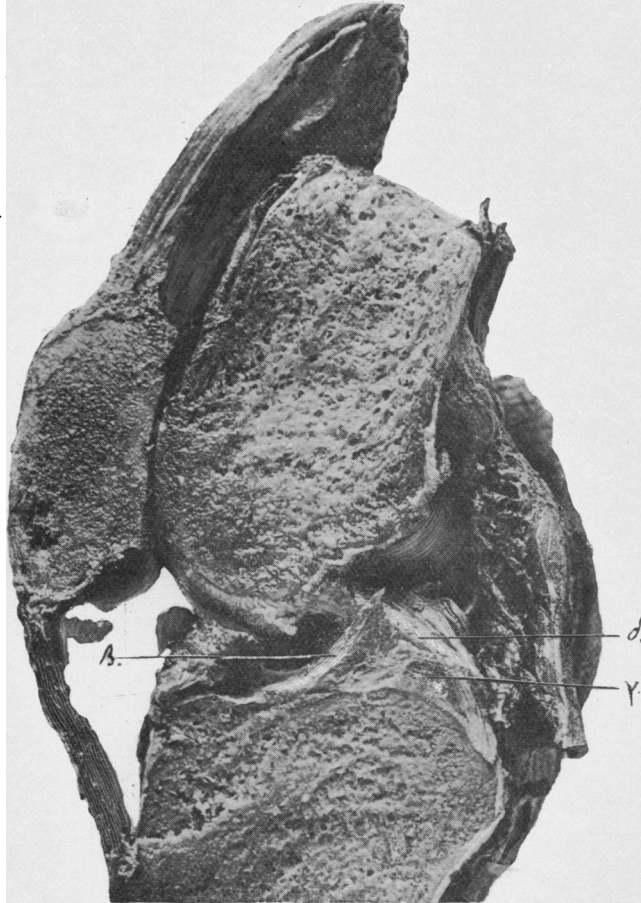

FIG. 4.—Median sagittal section of knee-joint. ($\frac{3}{4}$.)

femur behind the posterior crucial ligament, as the ligament of Wrisberg. The anterior attachment of the internal semi-lunar cartilage is to the inner side of a slight ridge which is usually present in the mid-line of the head of the tibia, at the junction of its anterior and second quarters (fig. 1, η; fig. 2 a).

The posterior cornu of the internal semi-lunar cartilage is attached to

the floor of the posterior crucial groove, where a small eminence (fig. 1, ζ) is sometimes present.

The tibial attachment of the anterior crucial ligament is indicated by a little knob (θ, fig. 1 and fig. 3) on the outer margin of the internal articular facet. From this the attachment runs transversely outward to about the mid-sagittal line of the tibial head. It will be noticed by referring to figs. 2 and 3 that this tubercle (θ) rises up just where it is relieved from the pressure of the anterior crucial ligament posteriorly, and the anterior cornu of the internal semi-lunar cartilage anteriorly.

The attachment of the posterior crucial ligament is seen in fig. 4: it is to the junction of the superior and posterior surfaces of the head, but I have not noticed that it is indicated by any special bony elevation. The best description of the head of the tibia with which I am acquainted is that in Humphry's *Human Skeleton*, but I cannot agree with the author in several points of exact detail; he does not, for instance, recognise the two crucial grooves or the oblique ridge separating them. I should not, however, have taken up time in discussing these points had I not believed that there is a definite mechanical reason for each one being as it is, and that they are good examples of a broad generalisation, which we all know but do not sufficiently impress upon our students—that bones are moulded by the contiguous soft parts much more than they mould those parts, and that every little elevation and depression has its meaning.

For the photographs I am indebted to my friend and pupil Mr Lupton.