Palæontology. — *The sixth (fifth new) femur of* Pithecanthropus erectus. By EUG. DUBOIS.

(Communicated at the meeting of September 28, 1935).

At the beginning of last month a fossil bone fragment, from my Java collection, was handed to me by the museum servant VAN DER STEEN, as he suspected that this might possibly again be part of the shaft of a *Pithecanthropus* femur.

The fragment, 12½ cm in total length, exhibited indeed some of the characters of such a left femur shaft. Especially similar it is in thickness and in the form of the corresponding part of the crista femoris, when the proximal end of that prominent ridge on this fragment is supposed to correspond exactly with the centre of the shaft on the femora *I, II, III* and *IV*. The shaft of *V* is too incomplete for comparison. The new fragment is perfectly straight and thus distinguished from those shafts, which are more or less arched from above downwards, and still more from the average in Man, which is approached by *V*.

This shaft is, however, different from the other ones, all of them, with regard to the place of the crista in the cross-section, and the cross-section itself, to such a degree, that I thought it safer provisionally to refrain from identification with the *Pithecanthropus* femur, and to wait the result of the anatomical preparation of the bone, consisting principally in the removal of the large concretions of pseudomorphous limonite replacing pyrite, which covered the surface extensively.

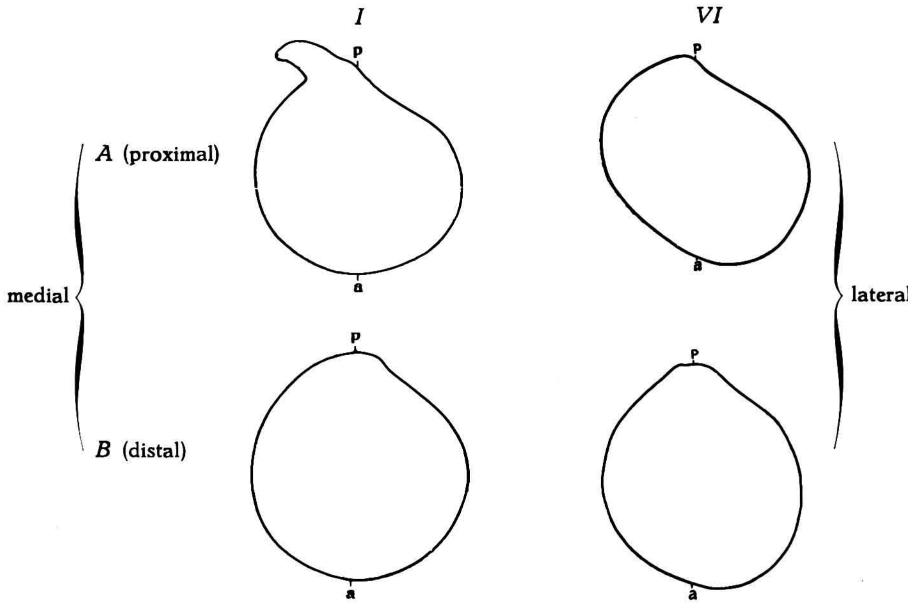
I have now finished this preparation, by which not only the whole somewhat corroded surface of the fossil bone fragment is laid bare, but also the internal structure, to a certain depth, has become visible. It now appears that those differences in the form of the cross-section, and the inward shifting of the crista femoris, especially at the proximal end of the fragment, are to be regarded as an individual variety, such as not infrequently is met with in Man [1]), where it certainly is in relation with differences in the development of the vasti muscles.

In femur I, at 20 cm above the patellar articular surface, and in the femur shaft *II*, at the corresponding place, the shape of the cross-section of the shaft is nearly round; there is only a shallow concavity, indicating the flattening of the outer-back surface of the shaft. In the femora *III, IV* and *V* there is, moreover, a marked flattening of the anterior surface; these three femora are platymeric.

The femora *II, III, IV* and *V* exhibit more or less of the internal bone structure, most clearly so *V*, as a consequence of the more or less intensive

[1]) See: JOHANNES BUMÜLLER, Das menschliche Femur, nebst Beiträgen zur Kenntnis der Affen-femora. (Inaugural-Dissertation), p. 28. Augsburg 1899.

(deeper or shallower) corrosion of the surface[1]). On the anterior surface we observe a diagonal system of structural stripes, about 3 cm broad, over



I. Cross-sections of the femur shaft of *Pithecanthropus erectus I* (1892), *A*: at 20 cm, and *B*: at 11 cm above the articular (patellar) surface of the knee-joint. *VI.* Cross-sections of the femur shaft *VI*, at the corresponding places, as judged from the comparison of both cristae, *A*: about 1½ cm below the proximal end of the fragment, and *B*: 2 cm above its distal end.

nearly the whole breadth of that surface, approximating the inner border and surpassing the outer border. The direction of these stripes is from above-inside to below-outward, as a dynamical reflection of the fibers of the back part of the musclus vastus medialis, attached at the crista femoris.

In our femur *VI* the proximal cross-section of the shaft, at a place corresponding with that of *I*, 20 cm above the patellar articular surface, clearly shows a displacement of bone substance from before-medially to before-laterally and, consequently, a relative medialward shifting of the crista femoris. This implies, of course, a shifting of the attachments of the vasti muscles. Indeed, we observe the system of structural oblique striping, which in its direction corresponds with that of the fibers of the back part of the musculus vastus medialis, shifted laterally to the borderlike antero-lateral surface, however this system is still about 2½ cm broad.

The distal cross-section of the femur shaft *VI*, at a place corresponding

[1]) EUG. DUBOIS, New evidence of the distinct organization of *Pithecanthropus*. Proceedings Vol. XXXVII (1934), pp. 139—145, with one figure and two plates. — I may call here attention to a necessary correction of that paper. On p. 142, in the third alinea, the established correspondence (parallelism) between the direction of the muscle fibers and the axes of the osteons really is of the vastus lateralis with the medial half of the femur shaft, and of the vastus medialis with the lateral half of the femur shaft.

with that of *I*, 11 cm above the patellar articular surface, shows a beginning lateral displacement of bone substance, which implies a beginning shifting of the back part of the vastus medialis muscle.

Femur *VI*, in this way, appears to be really a fossil remain of a *pithecanthropus erectus.*

This fossil femur is certainly not from Trinil but from another part of the Kendeng region. As the two last ones of the four removals of my collection have been effectuated without my direct supervision, they caused much disarrangement of such small and seemingly less valuable specimens. There is, however, some probability that this fossil was found at Kedung Brubus.

The question, why again and again thigh bones and no other limb-bones of *Pithecanthropus erectus* turn up in my collection, may find an answer in the consideration that the plurality of the bones were broken by crocodiles, mostly so the weaker ones, and that in the same proportion the latter were destroyed in the digestion process of those voracious animals.

Botany. — *A physiological analysis of the growth substance.* By A. J. HAAGEN SMIT and F. W. WENT.

(Communicated at the meeting of September 28, 1935).

The investigation of the growth substance of plants in the last few years has passed through a series of phases, of which we find an analogue in the work on sex hormones. Originally "auxin" was isolated from urin, and this substance was regarded as the plant growth hormone (1). After some time it was shown, that two auxins exist, *a* and *b*, which have the same activity as growth substance (2). Serious objections against the specificity of the universally employed avena test were raised, when it was found, that also β indole-acetic acid showed the same bending reaction in comparable dilutions (3). It was then shown, that it is highly probable, that in the top of the avena coleoptile auxin-*a* is formed, whilst β indole-acetic acid is formed by yeast, fungi and bacteria. The easy synthesis of β indole-acetic acid and related substances led to an investigation as to how the growth activity was related to a definite structure. Derivatives and homologues of β indole-acetic acid were synthesized and the activity determined by F. KÖGL and D. KOSTERMANS. Great differences in activity were found (4).

The problem acquired an added interest, when K. V. THIMANN showed that the activity of an active substance in the avena test is based on two independent properties: the polar transport in the coleoptile, necessary for the substance to arrive at the growing cells, and its property to stimulate cell elongation (5). Only those substances, which possess both properties are active in the avena test. THIMANN has shown, that β coumaryl-acetic acid did not cause a curvature in the avena test, but still stimulated the growth of small cylinders of avena coleoptiles, when they are put in a