Letters to the Editor.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, nor to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.]*

A Contribution to the Piltdown Problem.

SINCE the discovery of the fragments of the Piltdown skull in 1912, there has been considerable difference of opinion with regard to the manner in which the skull should be reconstructed, and as a necessary consequence of this, with regard to the extent of its cranial capacity.

Estimates of this have ranged from Smith Woodward's original figure of 1070 c.c. (see NATURE, vol. 92, p. 197; 1913) to his latest estimate of about 1300 c.c., a figure which is approved of by Elliot Smith (see NATURE, vol. 109, p. 726; 1922). Keith, on the other hand, at one time estimated its capacity at just above 1500 c.c., by measuring the amount of water displaced by the endocranial cast taken from one of
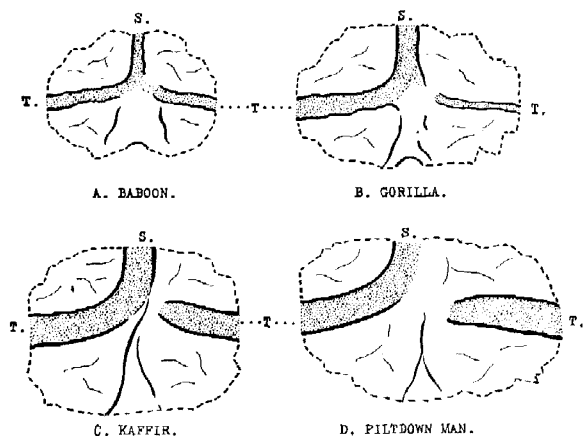

FIG. 1.—The stippled areas in the above drawings represent the arrangement and proportions of the venous sinus grooves (transverse sulci) on the internal aspect of the occipital bones of the skulls of : A. A baboon with a cranial capacity of 168 c.c. ; B. A gorilla with a cranial capacity of 527 c.c. ; C. A Kaffir with a cranial capacity of 1380 c.c. ; and D. Piltdown man with a cranial capacity of 1415 c.c., estimated from the width of the transverse sulci (T.).

his reconstructions (NATURE, vol. 92, p. 197; 1913), but his most recent view, derived from an application of Lee's formula to one of his reconstructions, appears to be that the cranial capacity is about 1400 c.c. (" The Antiquity of Man," by Sir Arthur Keith, vol. 2, 1925). All these estimations were determined from different types of reconstruction, the accuracy of which is disputed, and so far there has not seemed to be any other way of arriving at an estimate of the cranial capacity, and in this way helping to decide whether the higher or the lower estimates are more likely to be correct.

On examining the endocranial aspect of Mr. Barlow's casts of the Piltdown bones, one is struck by the large size and clearness of outline of the grooves for the middle meningeal vessels on the parietal fragments, and of the transverse sulci, that is to say, the grooves for the transverse venous blood sinuses on the occipital fragment. Now the large size of these grooves and of their corresponding blood-vessels does not appear to have been sufficiently emphasised as an indication of the size of the brain-case, for they seem in themselves to suggest a moderately large brain cavity.

That the size of the transverse sulci is correlated with the capacity of the cranium in a definite manner is clear from Fig. 1, inasmuch as these sulci are much narrower in a baboon than in a gorilla, and narrower in a gorilla than in man. This is what one would expect, seeing that these sulci lodge the veins, which convey practically all the venous blood returning from the brain. Larger channels are therefore needed for the larger amount of blood returning from larger brains.

A number of observations have therefore been taken on a small group of human skulls to test the degree of correlation between the width of the sulci and the cranial capacity, with the view of arriving at a means of determining the cranial capacity from the width of the sulci.

Average width of right and left sulci.	Cranial capacity.	Average width of right and left sulci.	Cranial capacity.
12·30 mm.	1300 c.c.	16·80 mm.	1370 c.c.
14·18	1436	17·26	1360
14·70	1320	17·33	1270
14·95	1130	17·80	1406
15·24	1615	18·10	1445
15·38	1410	18·20	1380
15·40	1250	18·30	1450
15·45	1280	18·35	1385
15·60	1290	18·45	1315
15·60	1270	19·40	1420
15·92	1450	19·48	1285
16·23	1170	19·50	1550
16·29	1380	19·52	1315
16·30	1350	19·75	1475
16·42	1320	20·70	1580
16·50	1266	21·00	1665

The coefficient of correlation between these two variables, in the thirty-two skulls measured, is 0·475, which is definitely significant. The regression formula for the calculation of the cranial capacity in terms of the width has been found to be as follows :

$$\text{Cranial capacity} = 27\cdot98 \times \text{width} + 894\cdot2.$$

In connexion with this equation there is a probable error of $\pm 69\cdot0$.

The average width of the two transverse sulci of the Piltdown occipital bone added together is 18·6 mm. The cranial capacity is therefore estimated from the above formula to be 1415 c.c., or to lie somewhere between a lower limit of 1346 c.c. and an upper limit of 1484. This makes the Piltdown skull mesocephalic, and supports those who have arrived at this conclusion by other methods.

Mr. S. Cohen and Mr. P. R. v. d. R. Copeman kindly assisted me in taking the measurements and in making the calculations.

M. R. DRENNAN.

Anatomy Department,
　University of Cape Town.

γ-ray Emission and the Law of Radioactive Transformation.

SOME time ago I described a method (*Phil. Mag.*, vi. 47, 23 ; 1924) of determining the period of transformation of RaC′, which consisted essentially in comparing the transformation constant λ with the velocity v of the recoil-atoms from RaC. The apparatus is shown in Fig. 1*a* : the active source, which consists of RaC deposited on nickel, is placed on the cone in the lower end of the apparatus. A beam of recoil atoms is limited by the screens S ; midway between the screens a number of slits is provided through which the *a*-particles from the recoil atoms