(*a*) The visual territories on the occipital region extend over the greater part of the cerebral hemispheres covered by the occipital bone. On the left side, the sulcus lunatus crosses the line of the lambdoid suture.

(*b*) In the parietal region, the orbital, fronto-parietal and temporal opercula have not approximated at the anterior end of the horizontal limb of the fissure of Sylvius, and a large fossa lateralis measuring about 2·5 cm. from above downwards, and 1·0–2·0 cm. from before backwards is present.

(*c*) The parietal lobule, and the temporal lobe stand out in high relief as exuberant masses of neopallial growth, and the central and the intraparietal sulci occur in primitive form.

(*d*) The Sylvian fissure runs obliquely upwards and backwards.

(*e*) Low development of the parietal association area.

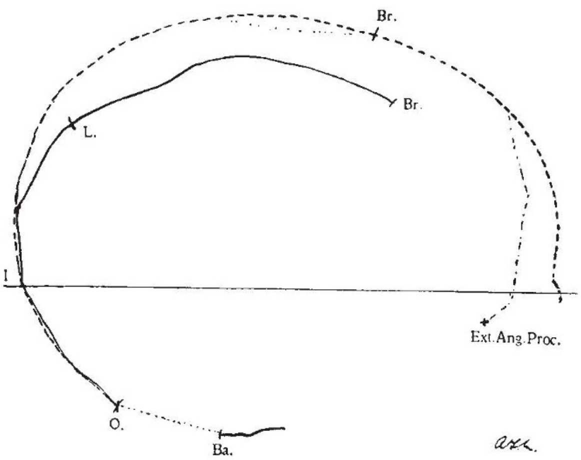

FIG. 3. Sagittal contours of Piltdown (Elliot Smith) and Swanscombe superimposed so that the inion and opisthion coincide. The Piltdown basion does not exist, but the opisthion is represented on the occipital fragment. The difference between the bregma-opisthion chord of the two specimens is not the result of the faulty reconstruction of the Piltdown skull, for if the bones of the two skulls be examined and angulated separately apart from the skull restorations as a whole, the Piltdown bones show an advanced developmental stage over the Swanscombe bones. (Swanscombe: full line. Piltdown: interrupted line.)

(*f*) The distribution of the middle meningeal arteries on the endocranial cast is more primitive in form than Piltdown.

(*g*) The shallow depth from above downwards of the cerebellar fossae is more primitive in form in Swanscombe.

Consideration of the above is sufficient to invite an inquiry into the status of the Piltdown skull. While the geological horizon of Swanscombe as the fossil of the middle gravels of the 100-ft. terrace is authenticated and recognized by the Geological Survey, the Piltdown horizon has been referred to the 80-ft. terrace, the 50-ft. terrace, and the 100-ft. terrace. The presence of the 'eoliths' or of the 'bone implement' is not reliable evidence of a Pliocene or Early Pleistocene status for Piltdown. The acquisition of a brain is a process of slow growth, and the differences between the actual anatomical features of the two skulls overwhelmingly favours the view that the geological horizon of Piltdown should be considered as later than that of the Swanscombe horizon in the middle gravels of the 100-ft. terrace.

The Swanscombe associated implements and flakes have been examined by the Abbe Breuil, who classes them as belonging to the St. Acheul 1 and 3 divisions of his nomenclature. The Swanscombe skull may therefore be referred to the St. Acheul 3 culture phase of Breuil.

The Swanscombe associated fauna is being examined separately by Mr. M. A. C. Hinton.

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Mass Equivalent of the Energy in Radioactive Transformations

WITH a spark between a lead electrode and an electrode of palladium or one made of a platinum rhodium alloy, it was found that doubly-charged lead ions were formed, which in the mass-spectrograph gave close doublets with the singly-charged rhodium and palladium ions at 102, 103 and 104. The mass differences were $0{\cdot}0860 \pm 0{\cdot}003$ at 104 (Pd), and $0{\cdot}0861 \pm 0{\cdot}003$ at 103 (Rh). Although the packing fractions of palladium and rhodium have not been determined directly, they occupy a position on Dr. Aston's curve[1] where the divergence of the atomic mass from an even integer reaches its maximum value of approximately $0{\cdot}085 \pm 0{\cdot}005$. Assuming this value as applying to palladium and rhodium, we find a value for the atomic masses of the lead isotopes of $206{\cdot}00 \pm 0{\cdot}01$ and $208{\cdot}00 \pm 0{\cdot}01$.

It is of interest to deduce the atomic masses to be expected for the lead isotopes from the atomic masses of uranium (238·088) and thorium (232·070) given in a recent letter[1]. In the uranium series of radioactive transformations, eight α-rays and six β-rays are ejected with a total energy of 52 million electron-volts (43 in the α-rays, and 9 in the β-rays). In the thorium series, six α-rays, four β-rays and an energy of $43{\cdot}3 \times 10^6$ e.v. are emitted. The α-rays and total number of electrons lost by the radioactive elements are in the proper number to form neutral helium atoms[2] of a mass 4·0039. If we should neglect the mass equivalent of the energy, we would be led to expect mass values for the lead isotopes of $238{\cdot}088 - (8 \times 4{\cdot}0039) = 206{\cdot}057$ and $232{\cdot}070 - (6 \times 4{\cdot}0039) = 208{\cdot}047$. These are higher than the values deduced above by several times the possible experimental errors, and it is impossible to ascribe the discrepancy to uncertainty in the masses of palladium and rhodium, as it would be necessary to suppose that the masses of those elements diverge from integers by less than half the amount required by Dr. Aston's curve.

We have thus an example of the necessity of allowing for the mass equivalent of the energy emitted. As one million electron volts is closely equivalent to 0·001 mass units, the 52×10^6 e.v. and $43{\cdot}3 \times 10^6$ e.v. would reduce the expected mass of uranium lead to 206·005 and that of thorium lead to 208·004, which agree within the experimental error with the values deduced from the observations in the first paragraph. Unfortunately, the precision of the measurements is not yet sufficient to decide whether the maximum energy of the β-rays (9×10^6 e.v. and $6{\cdot}3 \times 10^6$ e.v.) or the mean energy must be considered, or even whether their energy has a definite mass equivalent.

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[1] NATURE, [137, 120 (1936)].
[2] F. W. Aston, NATURE, 137, 358 (1936).