

DR. DUBOIS' SO-CALLED MISSING LINK.¹

AT a meeting of the Royal Dublin Society, held on Wednesday, January 23, Dr. D. J. Cunningham, F.R.S., Professor of Anatomy in the University of Dublin, and Hon. Secretary of the Society, read a paper upon the characters presented by the fossil remains recently described by Dr. Eugene Dubois. (See NATURE, January 24, p. 291.) The following is an abstract of this communication.

The fossil remains are three in number, viz.: the upper part of a cranium, a right-upper wisdom tooth, and a left femur. These are believed to belong to the Pleistocene period, and, according to Dubois, present characters which justify him in placing the animal to which they belonged in a new family which stands midway between man and the apes. The specimens were found in Java, on the left bank of the Bengawan River, in the neighbourhood of Trinil. Each was exhumed at a different time, but all at the same level, viz. 1 m. below the dry-season level of the river, and from 12 to 15 m. below the level of the plain through which the stream has cut its way.

The characters assigned to the new family proposed by Dubois are the following: "Cranium absolutely and relatively to body-size, much more roomy than in simiidae, but less roomy than in hominidae; cranial capacity about two-thirds of the average capacity of the human cranium. The inclination of the cervical surface of the occiput distinctly stronger than in simiidae. Dentition after the type of the simiidae. Femur similar in its dimensions to that of man, and designed for the upright walk and attitude."

The leading peculiarities of the cranium of the so-called Pithecanthropus are: (1) the low depressed character of the cranial arch; (2) the extreme narrowness of the frontal region;

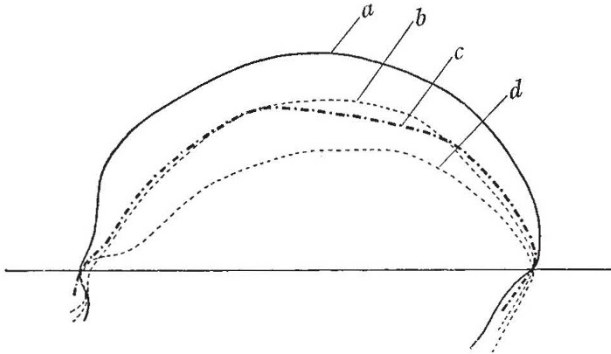


FIG. 1.—Outlines of the cranial arch of: *a*, ordinary Irish skull; *b*, skull of a microcephalic idiot; *c*, the fossil cranium described by Dubois; *d*, skull of a gorilla. The base-line is one which passes through the external occipital protuberance behind, and the centre of the glabella in front.

and (3) the striking development of the superciliary ridges. These are all to some extent simian features: and when outlines of the antero-posterior cranial arch of an ordinary Irish skull, of the skull of a microcephalic idiot (the brain of which presented many atavistic characters), of the fossil cranium, and of the skull of a young female gorilla, are reduced to the same size and superimposed over each other, it is seen that the idiot cranium and the fossil cranium present almost identically the same curvature; further, these two outlines occupy a place almost exactly midway between the Irish cranial outline and that of the gorilla. (Fig. 1.)

Another combination, equally interesting and equally instructive, is one in which the outlines of the antero-posterior cranial arch of the fossil form, of the Neanderthal skull, of the Spy cranium No. 2, and of the ordinary Irish skull, are superimposed over each other. (Fig. 2.) In this the Neanderthal arch is seen to present almost exactly the same characters as those of the fossil form, and, further, to lie nearer to it than to the outline of the arch of the modern Irish skull. The Spy cranium No. 2 takes its place between the normal skull and the Neanderthal cranium, so that by a series of easy and nearly equal gradations

we are led from the fossil form up through the Neanderthal and Spy forms to the modern cranial arch.

The heavy, strongly marked superciliary ridges constitute another Neanderthalid feature of the fossil form, but the transverse frontal diameter is very much less than that of the Neanderthal or Spy crania. In this respect the fossil cranium closely approaches the microcephalic skull referred to above, and also the skull of the gorilla.

When the measurements of the fossil cranium are compared with those of the Neanderthal and Spy skulls, other striking resemblances become manifest.

—	Maximum antero-posterior diameter.	Maximum transverse diameter.	Cephalic index.	Cranial capacity
Fossil cranium	185	130	70	1000(?)
Neanderthal cranium ...	200	144	72	1200(?)
Spy cranium No. 1 ...	200	140	70	—
Cranium of intelligent adult woman measured in the Anthropometric Laboratory of Trinity College	167	139	83.2	—

The fossil cranium is thus only 15 m.m. shorter and 10 m.m. narrower than the Spy cranium No. 1. In every anthropo-

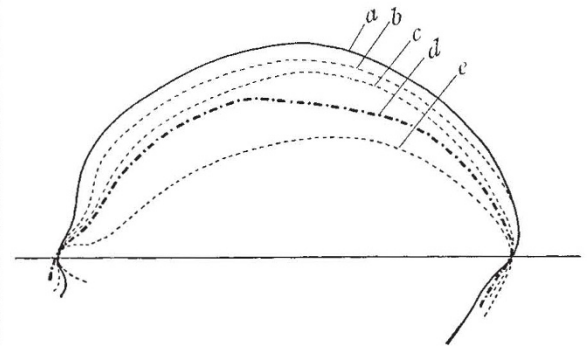


FIG. 2.—Outlines of the antero-posterior cranial arch of: *a*, ordinary Irish skull; *b*, Spy cranium No. 2; *c*, Neanderthal cranium; *d*, the fossil cranium described by Dubois; *e*, the skull of a gorilla. Base-line the same as in Fig. 1.

metric laboratory intelligent individuals are occasionally measured who possess an antero-posterior cranial diameter very much less than that of the fossil cranium. In these cases, however, the head is usually brachycephalic, and presents a high and full cranial arch. In the above table the diameters of one of the smallest heads measured in the Dublin University Laboratory are given.¹

Dubois calculates, from a comparison with ape crania, that the fossil specimen had originally a capacity of at least 1000. The average capacity of the European skull may be said to range from 1400 to 1500 (Welcker), and the Neanderthal cranium has been computed to have had a capacity of 1200. In this respect, therefore, the Neanderthal skull takes an intermediate place between that of the fossil form and of the European. Further, it should be borne in mind that a capacity of 1000 is usually regarded (as indeed Dubois points out) as being the physiological minimum for the human cranium.

From these considerations the fossil cranium described by Dubois is unquestionably to be regarded as human. It is the

¹ "Pithecanthropus erectus, eine menschenliche Ubergangsform aus Java." By Eugene Dubois. (Batavia, 1894.)

lowest human cranium which has yet been described. It presents many Neanderthaloid characters, but stands very nearly as much below the Neanderthal skull as the latter does below the ordinary European skull. The similarity in form which it presents to the microcephalic cranium, with which it has been compared, is undoubtedly interesting, but on this account we are not to conclude that it belonged to a person of feebler intellect than others of the same race. The Neanderthal skull was supposed by certain observers at one time to have been that of an idiot, but this idea was disposed of when other crania, presumably belonging to the same geological period, and possessing similar characters, were discovered. That the fossil cranium should in many respects resemble certain microcephalic skulls, is not surprising: indeed, to some extent it was to have been expected, seeing that a considerable number of this class of idiots present undoubted atavistic characters in so far as brain and cranium are concerned.

Dubois, in his description of the fossil cranium, institutes a close comparison between it and the crania of the higher apes, and only incidentally touches upon its relationship with the human cranium. He asserts that no good could arise from a comparison between it and the Neanderthal and Spy remains, seeing that the latter are pathological. It is not within the scope of an abstract, such as this, to take up the gauntlet on a question of this kind. It will be sufficient to assert an entire accordance with the views so ably advocated by Prof. Huxley, viz. that the Neanderthal and Spy crania are typical of the earliest human race with which we are acquainted.

It is not necessary to delay over the femur. That it is human in every respect, no one could for a single moment doubt. Further, it is curious to note that its form and proportions are more those of a modern than of a prehistoric thigh-bone. It presents none of the characters which distinguish the Spy femora. Its length is 455 m. m., therefore the height of the individual to whom it belonged must have been 1654 m. m., or, in other words, about the same as that of an average Frenchman.¹ From the fact of the femur being found at a distance of from 12 to 15 m. from the place where the cranium was discovered, as well as from other considerations, it is very unlikely that the two specimens belonged to the same individual.

The tooth is undoubtedly a very remarkable specimen. Its great size and strong divergent fangs are characters which at first sight appear to separate it widely from an ordinary human upper wisdom tooth. But we know that in low races, such as the Australian and the Negro, and also in the ancient Neanderthaloid race, the wisdom tooth has not undergone the same retrograde changes which we observe in the European and other mesognathic or orthognathic people. If we take the mean of the antero-posterior and the transverse diameters of the crown of the fossil tooth, we get a result of 13.3. A right upper third molar extracted from the jaw of a negro, treated in the same way, yields a result of 11.5, whilst three Irish upper wisdom teeth, selected at random, give an average of 9. The negro tooth is thus seen, in point of size, to be as far removed from the European tooth as the fossil tooth is from it, and the same may be said for the condition of the fangs. The fossil tooth, so far as one can judge from the figure, is fashioned more after the human model than the simian. The variability of an upper wisdom tooth in man is very remarkable, not only in regard to size, but also in the disposition of its cusps and fangs.²

From what has been said, it will be seen that the skull and the tooth, even granting that they are from the same individual, present no such characters as would warrant the formation of a new family. The cranium at least is undoubtedly human. Most certainly they are not derived from a transition form between any of the existing anthropoid apes and man; such a form does not and cannot exist, seeing that the divarication of the ape and man has taken place low down in the genealogical tree, and each has followed, for good or bad, its own path. The so-called Pithecanthropus is in the direct human line, although it occupies a place on this considerably lower than any human form at present known.

¹ Topinard gives the average height of the French as 1650 m. m.

² In the museum of the Dublin School of Dental Anatomy there is an upper wisdom tooth extracted from the maxilla of an Irishman, the crown of which presents a transverse diameter of 13 m. m., and an antero-posterior diameter of 12 m. m. (mean result 12.5); which possesses seven cusps and four stout fangs: two of the latter being partially fused. This tooth is very little smaller than the wisdom tooth of the fossil form, and is more remarkable in the way of cusps and fangs.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The Biological Club held its jubilee meeting on Saturday last, when the professors of the biological faculties in the University were entertained to a commemorative dinner given in Merton College. The ravages of influenza unfortunately deprived the Club of the presence of several familiar members and of more than one expected guest; but the presence in Oxford of Prof. Bayley Balfour gave the Club an opportunity of extending its welcome to an old friend and an additional distinguished visitor. In the absence of Mr. G. C. Bourne, the presidential chair was taken by Mr. Henry Balfour, of Trinity. Profs. Bayley Balfour and Lankester replied for the guests.

In accordance with a recommendation from the Board of Faculty of Natural Science, the Council has approved of the subject of Astronomy being added to the list of subjects which may be offered in the Honour School of Natural Science. For a reason which is not very obvious at first sight, a candidate who offers Astronomy as a final subject must have obtained honours in the first or second public examination, but need not have passed any of the preliminary science examinations; and a candidate who has passed the science preliminaries is not eligible to compete in the Honour School of Astronomy unless he has obtained honours in the first or second public examination. The object of this rule, which places the School of Astronomy in a position different to that of any other science school, is to compel candidates to take Honours either in Mathematical Moderations or Finals before entering on Astronomy. But the object is not attained, for as the statute now runs, a man who has taken honours in Classical Moderations or in any Final Honour School may enter for the Astronomical School, whilst a man scientifically trained cannot. It may be hoped that the rule, which as it stands is absurd, may soon be rectified. The subject of Astronomy has long been an optional or additional subject in the Honour School of Natural Science, but like other additional subjects, has not attracted students. Astronomy having asserted its claims to recognition, Anthropology has followed its lead, and the Faculty of Natural Science has by a large majority sent up a recommendation to Council that the subject of Anthropology should be added to the Final School. The answer of Council has not yet been received.

In a Congregation held last week, the Curators of the University Chest were empowered to make sundry payments to the Curators of the Botanic Garden, to bring up the whole income of the Garden during each of the next four years to a sum sufficient to defray its expenses.

Mr. G. C. Bourne, Fellow of New College, has been elected a Delegate of the University Museum, in place of Mr. E. Chapman, Fellow of Magdalen College, resigned.

CAMBRIDGE.—The vacancy in the Sadlerian Professorship, caused by the death of Dr. Cayley, has been filled up by the election of Dr. A. R. Forsyth, F.R.S., University Lecturer in Pure Mathematics. Dr. Forsyth is well known as the author of standard text-books on Differential Equations and the Theory of Functions, and of many papers on the higher branches of pure mathematics. He is a Fellow of Trinity, and a member of the Council of the Senate.

Dr. Charles Waldstein, Reader in Classical Archæology, has been elected to the Slade Professorship of Fine Art, vacant by the retirement of Prof. Middleton.

A shower of "fly-sheets" has fallen on the University on the question of requiring further evidence of power to write essays in the various degree examinations. The questions will be decided by the vote of the Senate on Thursday afternoon.

SINCE 1892 there has been a decrease in the number of candidates for entrance into the Central Technical College at South Kensington. But though fewer candidates have presented themselves, the number admitted is about the same, indicating either that the examiners lowered the matriculation standard, or that candidates were better prepared for the examination. In the report of the work of the College during the session 1893-94, various causes are given to account for the diminution of candidates. One is the great increase of facilities for obtaining technical education in London and in the provinces since the College opened. To what extent this in-