Observations on the Occipital Bone in a Series of Egyptian Skulls, with Especial Reference to the Persistence of the Synchondrosis Condylo-Squamosa (Zaaijer; Synchondrosis Intraoccipitalis Posterior, B N A.)

Author(s): H. Dorothy Smith

Source: *Biometrika*, Vol. 8, No. 3/4 (Jan., 1912), pp. 257-266
Published by: Oxford University Press on behalf of Biometrika Trust
Stable URL: http://www.jstor.org/stable/2331581
Accessed: 22-02-2016 18:26 UTC

VOLUME VIII JANUARY, 1912 NOS. 3 AND 4

OBSERVATIONS ON THE OCCIPITAL BONE IN A SERIES OF EGYPTIAN SKULLS, WITH ESPECIAL REFERENCE TO THE PERSISTENCE OF THE SYNCHONDROSIS CONDYLO-SQUAMOSA (ZAAIJER; SYNCHONDROSIS INTRAOCCIPITALIS POSTERIOR, B N A.)

BY H. DOROTHY SMITH, B.Sc. Crewdson-Benington Student in Craniology.

WHILE taking a series of measurements at University College, under the supervision of Professor Pearson, on a collection of Egyptian crania of the third dynasty, the writer noted certain peculiarities in the occipital regions of several specimens. In particular a distinct fissure of varying length, extending inwards from the masto-occipital suture (the origin being located generally by the mastoid foramen) towards the foramen magnum, was well shown in several adult specimens. This was identified by Professor Thane with the persistent synchondrosis condylo-squamosa described by T. Zaaijer (*Anatomische Hefte*, herausgegeben von F. Merkel und R. Bonnet, 1. Abteilung, XII. Heft. 1894). An examination of the collection was then undertaken for comparative purposes, and in this the writer is much indebted to both Professor Pearson and Professor Thane for their kind assistance.

The first 1100 specimens examined included the crania of 62 children of whom the youngest was probably about 5 years old. The only instance of persistence of the synchondrosis condylo-squamosa in its whole extent from the masto-occipital suture to the margin of the foramen magnum was found in the cranium of a child of about 7 years of age—and this on the left side only, while on the right the synchondrosis persists to within 8 mm. of the margin of the foramen magnum. In Plate I. will be seen the condition of this cranium with the component parts in situ (A); in figure (C) will be seen the skull with pars basilaris and pars condyloidea removed and these parts are seen separately in Fig. (B).

The best examples among the adult specimens show an irregular fissure (Plates II. and III.), directed transversely inwards from the masto-occipital suture for about 25 mm. Of crania showing a fissure of 15 mm. or more in length,

there are 12 adult and 6 young specimens; and, of these, 8 adult and 6 young specimens show the condition on both sides to a greater or less extent, while the remaining 4 adult (one a young adult) show it on the right side only.

Of the rest, 48 adult and 20 young specimens show a fissure of less than 15 mm. length—in some cases only a slight trace—and of these 29 adult and 11 young show the condition on both sides, and the remaining 19 adult and 9 young, on one side only.

Thus, in the 1100 crania examined, the conditions found were:—

Specimens Examined	Synchondrosis Obliterated	Fissure 15 mm. or more	Less than 15 mm.	Percentage showing persistent Synchondrosis Condylo-squamosa
1038 adult	979	12	47	5·7
62 young	36	6	20	41·9

The percentage of adult crania showing indications of the persistence of the synchondrosis condylo-squamosa agrees very closely with the figure (5·3) found by Zaaijer in the collection of adults examined by him, and similarly the condition has been found in a much higher percentage of young crania. The condition also appears to be of more frequent occurrence among the female crania, for of 322 adult female crania 30 show persistence of the synchondrosis condylo-squamosa (9·3 per cent.), while in 457 male crania the condition was found in only 20 specimens (4·3 per cent.).

It was thought worth while to examine the crania of other primates for comparison, and the writer was enabled by the courtesy of Professor Keith to examine the collection at the Royal College of Surgeons. This collection includes a higher percentage of young specimens, and also a number of younger individuals than any in the collection of human crania under observation, and, as was therefore to be expected, a great number of the young specimens show the condition with the synchondrosis extending from the masto-occipital suture to the margin of the foramen magnum, but few adults show more than traces of the developmental condition. Owing to the very great range in size of the crania of the other primates a standard of 15 mm. length of fissure has not been adopted here as in the case of the human crania, and the cases have been grouped according to whether the fissure reaches the margin of the foramen magnum or stops short of it.

Thus 13·3 per cent. of the adult anthropoid ape crania examined show some indication of the synchondrosis condylo-squamosa, while 21·8 per cent. of the young specimens show the whole length of the synchondrosis, and 54·5 per cent. show the condition in varying degrees.

Of the Lemuroidea 17 specimens (14 adult and 3 young) were examined, and a single adult showed a trace of the synchondrosis while two young showed the

whole extent. The remaining specimen—a foetal cheiromys—showed the various components of the occipital entirely separate.

Specimens Examined	Synchondrosis Obliterated	Extending from Masto-occipital suture to Foramen Magnum	Shorter Portions
SIMIIDAE			
12 chimpanzees { 7 adult	7	—	—
12 chimpanzees { 5 young	1	3	1 (acrocephalic)
5 gorillas { 3 adult ...	3	—	—
5 gorillas { 2 young ...	2	—	—
11 orang-outans { 5 adult	3	—	2
11 orang-outans { 6 young	1	4	1
6 gibbons { 2 adult ...	2	—	—
6 gibbons { 4 young ...	1	1	2
CERCOPITHECIDAE			
57 various { 29 adult ...	27	—	2
57 various { 28 young ...	17	3	8
CEBIDAE			
19 various { 10 adult ...	6	—	4
19 various { 9 young ...	2	1	6
HAPALIDAE			
5 various { 4 adult ...	4	—	—
5 various { 1 young ...	1	—	—

Certain specimens among both the Egyptian crania, and the other primates, show the synchondrosis associated with an ossicle at the masto-occipital end (see our Plate IV. B), and the writer finds that the persistent portions of the synchondrosis are invariably at this end. In no case has the condition been found like that cited as typical by A. Rambaud and Ch. Renault (*Origine et Développement des Os*, p. 105 and Fig. 8, Plate VII.), where the ends of the fissure reaching the margin of the foramen magnum remain open after the other portions have been obliterated.

It will be seen in Plate I. A that the line of the synchondrosis condylo-squamosa terminates internally in a small angular projection which forms the lateral boundary of a distinct median bay in the hinder margin of the foramen magnum. This bay, which has a breadth of 9 mm. and a depth of 4 mm., may be termed the *opisthial notch*, as corresponding to the region of the opisthion. Of the 85 crania which show some degree of the persistence of the synchondrosis condylo-squamosa, this notch is more or less marked in 43, whereas of 100 skulls taken at random from the series, which have the synchondrosis completely obliterated, an appreciable notch is present only in 9. A faint indication of the opisthial notch is however frequently to be recognised in the adult skull.

In one somewhat aged male skull, shown in Plate V. A, and presenting only a slight trace of the synchondrosis condylo-squamosa at the end abutting on the masto-occipital suture of the right side, the opisthial notch has a depth of 11 mm. with a maximum breadth of 10 mm. In another adult male skull, with a trace of the synchondrosis on the right side only, the foramen magnum is prolonged backwards as a broad excavation which is not sharply defined laterally, but must be put into the same category. The antero-posterior diameter of the foramen magnum in this case measures 42·5 mm. and the greatest breadth is 30·5 mm.

The opisthial notch evidently results from a defective development of the lower division of the occipital squama, which is formed by the supra-occipital element of the bone, and especially of the part which is derived from the so-called ossicle of Kerckring (*manubrium squamae occipitis*, Virchow). The existence of such a notch in the adult bone is not mentioned in Ledouble's *Traité des Variations des Os du Crâne*, Paris, 1903; but Hamy records a case of a microcephalic foetal skull in which there was a small posterior encephalocele resulting from absence of the ossicle of Kerckring (*Bull. de la Soc. d'Anthropol. de Paris*, 1867, p. 511). Hamy refers to this case again in his paper "Recherches sur les fontanelles anomales du crâne humain," *Journal de l'Anatomie*, T. VII. 1870—71, pp. 591—601, and there uses the name *fontanelle cerebelleuse* for the membranous gap at the base of the occipital squama. This condition would appear to represent a persistence to a greater or less extent of Hannover's *spinoso-occipital membrane*. Ledouble states (*op. cit.* p. 53) that there is a similar defect of ossification in some skulls of normal foetuses in the *Museum d'histoire naturelle* of Paris, as well as in the skull of a hydrocephalic foetus in the Musée Dupuytren.

In only one instance among the Egyptian crania under observation did the writer find any indication of the division of the pars basilaris, which leads to the separation of an anterior segment, first observed by Etienne Geoffroy Saint-Hilaire and named by him *oto-sphenal*, and subsequently designated by Albrecht *basiotique*. This occurs in a young specimen, about 12 years of age (Plate V. B, Cranium E 801), which also shows a slight indication of the synchondrosis condylo-squamosa. Here the basilar portion has on each side a cleft directed transversely inwards from the petro-occipital fissure for a distance of 9 mm. on the right side and 4·5 mm. on the left. The intervening bridge of bone has a breadth on the surface of 15·5 mm. The division is more strongly marked on the endocranial aspect of the bone, where the fissures are only 12 mm. apart, and are connected by a shallow transverse furrow. An incomplete division of the basilar portion was found by Lucy 25 times in 496 skulls (5·04 per cent.). This skull also shows two well marked pressure facets at the hinder margin of the foramen magnum.

Owing to the large number of crania under consideration and difficulties of access it has not yet been possible to examine the whole of this Egyptian series very carefully, but the writer has made a more cursory examination of the

remaining 629 crania in the collection for further examples of the persistence of the synchondrosis condylo-squamosa with the following results:—

Specimens Examined	Synchondrosis Obliterated	Fissure 15 mm. long or more	Less than 15 mm.	Percentage showing Synchondrosis Condylo-squamosa
608 adult	551	8	49	9·3
21 young	6	3	12	71·4

The cranium shown in Plate IV. A is that of a child of about 5 years of age which shows the whole extent of the synchondrosis condylo-squamosa from the masto-occipital suture to the foramen magnum on both sides. This is one of the Wood-Jones collection of Nubian specimens of Roman date obtained from cemetery 14. The condition of the occipital here was noticed by Dr Derry, and the specimen has been kindly lent for the purposes of this paper.

In addition to the Plates already mentioned is included one (Plate VI.) illustrating the development of the human occipital before and after birth, from a series in the Anatomical Museum of University College. The age of these specimens is estimated as follows. (*a*) Foetus of about five months. (*b*) At birth. (*c*) Child of about 1 year. (*d*) About three years. (*e*) About 5 years.

The condition of these specimens would indicate that the obliteration of the synchondrosis condylo-squamosa begins during the third or fourth year of life (Zaaijer, pp. 199—202), but in conclusion it would appear that there is a greater range of variation in the age at which the fusion takes place than is generally stated, and in certain cases the synostosis is not completed even in the adult.