THE OCCURENCE OF TAURODONTISM IN THE ANCIENT INHABITANTS OF ANATOLIA[1]

A Preliminary Report

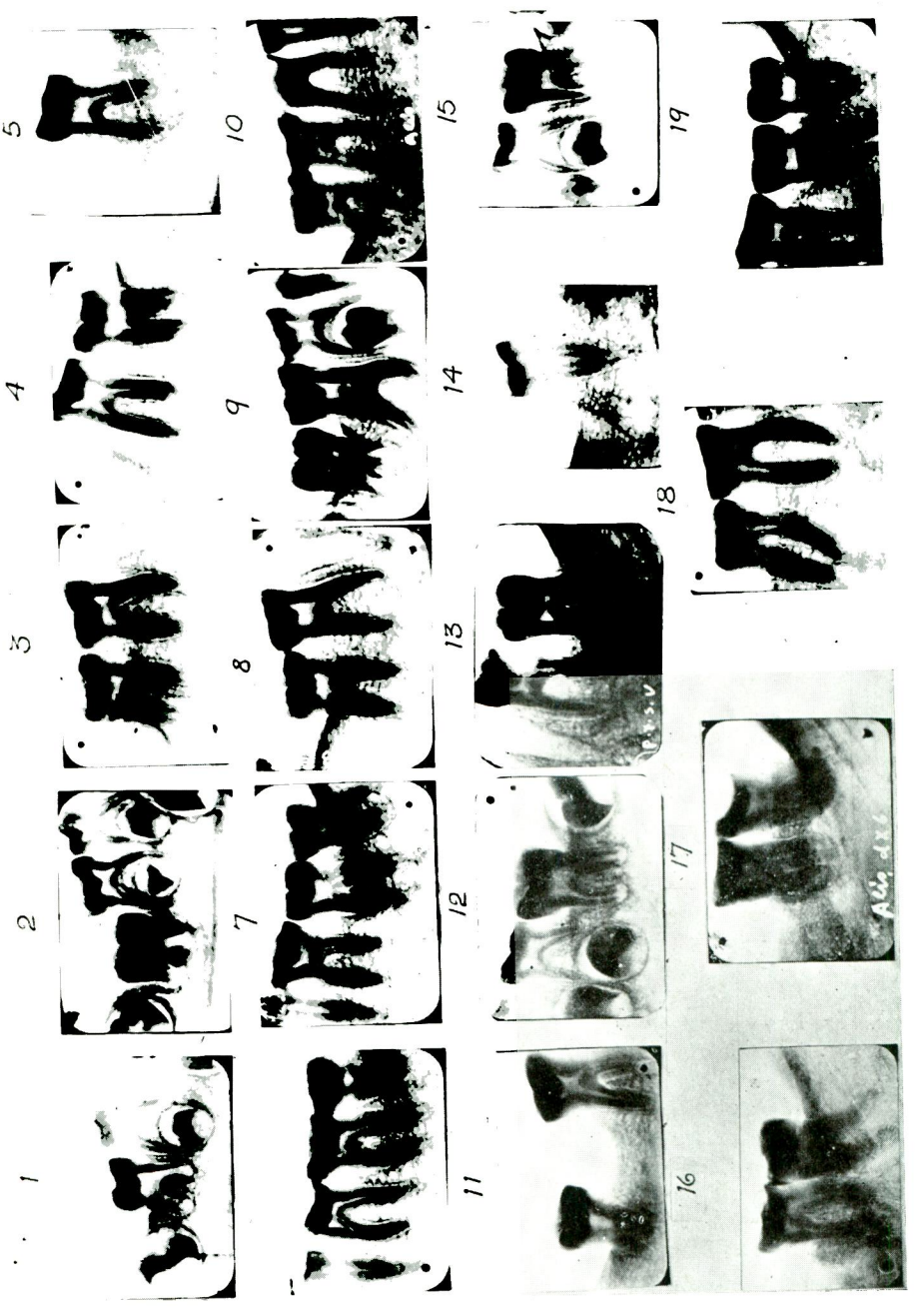
MUZAFFER SÜLEYMAN ŞENYÜREK, M. A., Ph. D.

Assistant Professor of Anthropology, University of Ankara

About four decades ago it was observed that the teeth of Neanderthal man, though variable, had rather large pulp cavities. As it was assumed that the enlargement of the pulp chambers did not occur in the Anthropoid apes and in modern man, this feature was considered to be a specialization peculiar to *Homo primigenius*. It was then concluded that on account of this specialization and other considerations Neanderthal man could not represent a stage in the evolution of *Homo sapiens*, as it was till then assumed. Sir Arthur Keith, the eminent British anthropologist to whom our science owes much, was at first not in favor of this view, but subsequently fully adopted it. Sir Arthur Keith proposed the term cynodontism for the condition of the molars where the pulp chamber was small. He designated the opposite condition where the pulp chambers were enlarged at the expense of the roots and were deeply embedded in the dental alveoli, taurodontism.

For a long time thereafter most of the authorities were in agreement that taurodontism was a specialization and hence, according to them, the fossil hominids exhibiting this condition could not stand on the line of evolution of *Homo sapiens*. However, notably after the discovery of Peking Man (*Sinanthropus pekinensis* Black), displaying taurodontism in a moderate degree, opposite views were also expressed by the late Davidson

[1] This report was read in the Third International Congress of Anthropological and Ethnological Sciences held in Brussels, Belgium, between August 15 and 23rd, 1948. In the Present paper some additions have been made to the footnotes.



LEVHA I

Şekillerin izahı

(Resimler biraz küçültülmüştür)

Şekil 1 — Kaledoruğu (Samsun) No. 1. Çağ : Bakır.
Şekil 2 — Alaca Höyük No. VIII. Çağ : Bakır.
Şekil 3 — Maşat Höyük No. 7. Cağ : Bakır.
Şekil 4 — Alaca Höyük No. 2. Çağ : Bakır.
Şekil 5 — Maşat Höyük No. 3. Çağ : Bakır.
Şekil 6 — Alişar Höyük No. bX 37. Çağ : Hitit İmparatorluğu.
Şekil 7 — Alişar Höyük No. bX 35. Çağ : Hitit İmparatorluğu.
Şekil 8 — Alişar Höyük No. bX 43. Çağ : Hitit İmparatorluğu.
Şekil 9 — Pazarlı No. p. XI. Çağ : Post - Hitit - Frig.
Şekil 10 — Alişar Höyük No. cX. 7. Çağ : Post - Hitit - Frig.
Şekil 11 — Karaoğlan No. V. Çağ : Post - Hitit - Frig.
Şekil 12 — Alişar Höyük No. dX 20. Çağ : Met - Pers - Hellenistik.
Şekil 13 — Pazarlı No. p. t. s. V. Çağ : Met - Pers - Hellenistik. ?
Şekil 14 — Pazarlı No. p. t. XIII. Çağ : Met - Pers - Hellenistik. ?
Şekil 15 — Alişar Höyük No. dX 13. Çağ : Roma - Bizans.
Şekil 16 — Alişar Höyük No. dX 1. Çağ : Roma - Bizans.
Şekil 17 — Alişar Höyük No. dX 6. Çağ : Roma - Bizans.
Şekil 18 — Alişar Höyük No. bX 65. Çağ : Türk.
Şekil 19 — Alişar Höyük No. bX 56. Çağ : Türk.

(Taurodontism hem dolichokephal ve hem de brachykephallerde mevcuttur. Irk ve cins meseleleri gelecek raporumda münakaşa edilecektir).

PLATE I

Explanation of the Figures

(Figures are slightly reduced)

Fig. 1 — Kaledoruğu (Samsun) No. 1. Period : Copper.
Fig. 2 — Alaca Höyük No. VIII. Period : Copper.
Fig. 3 — Maşat Höyük No. 7. Period : Copper.
Fig. 4 — Alaca Aöyük No. 2. Period : Copper.
Fig. 5 — Maşat Höyük No. 3. Period : Copper.
Fig. 6 — Alişar Höyük No. b X 37. Period : Hittite Empires.
Fig. 7 — Alişar Höyük No. b X 35. Period : Hittite Empires.
Fig. 8 — Alişar Höyük No. b X 43. Period : Hittite Empires.
Fig. 9 — Pazarlı No. p. XI. Period : Post - Hittite - Phrygian.
Fig. 10 — Alişar Höyük No. c X 7. Period : Post - - Hittite - Phrygian.
Fig. 11 — Karaoğlan No. V. Period : Post - Hittite - Phrygian.
Fig. 12 — Alişar Höyük No. d X 20. Period : Medo - Persian - Hellenistic.
Fig. 13 — Pazarlı No. p. t. s. V. Period : Medo-Persian-Hellenistic.?
Fig. 14 — Pazarlı No. p. t. XIII. Period : Medo-Persian-Hellenistic. ?
Fig. 15 — Alişar Höyük No. dX 13. Period : Roman-Byzantine.
Fig. 16 — Alişar Höyük No. dX I. Period : Roman-Byzantine.
Fig. 17 — Alişar Höyük No. dX 6. Period : Roman-Byzantine.
Fig. 18 — Alişar Höyük No. bX 65. Period : Turkish.
Fig. 19 — Alişar Höyük No. bX 56. Period : Turkish

(Taurodontism occurs in both the dolichocephals and brachycephals. Questions of race and sex will be discussed in my coming report).

Black (1927) and Franz Weidenreich (1937). In other words, about a decade ago there were two opposing schools of thought in this regard. One school of thought, led by P. Adloff and Sir Arthur Keith, assumed that taurodontism was a specialized feature and that the fossil hominids possessing this feature could not stand on the line of descent of *Homo sapiens*. The other school of thought, led by D. Black (1927), J. C. M. Shaw (1928) and F. Weidenreich (1937), regarded it as a primitive hominid feature and admitted the taurodont fossil hominids into the line of evolution of *Homo sapiens*.

However, in spite of the opposing views expressed on the significance of taurodontism, nobody had yet studied the pulp chambers of a sufficient series of infrahuman primates. In view of this need, I decided to study the teeth of Primates by means of the x-rays. In this first study, the molars of 90 Primates, mostly infrahuman and some human, were x-rayed [2] and the results of this investigation were published in 1939 (Şenyürek, 1939). In this study it was demonstrated that, contrary to the previous claims, taurodontism occured quite frequently in some Anthropoid genera and was of common occurence in some Platyrrhine monkeys. Furthermore, evidence was brought forward to demonstrate that a moderate degree of taurodontism was characteristic of primitive hominids in general and that *Homo sapiens* was derived from a moderately taurodont ancestor.

At a later date, while studying their crania, I noticed that some molars of the ancient inhabitants of Anatolia had relatively large bodies, indicating an enlargement of the pulp cavities and I decided to have them x-rayed [3]. Altogether, in three installments [4], the lower molars of 108 ancient Anatoli-

[2] During the course of a second visit to U. S. A. in 1946-1947 the molars of some more infrahuman primates were x-rayed in the American Museum of Natural History and the U. S. National Museum and they will be published in a future report together with the previous material x-rayed at Harvard.

[3] A taurodont tooth from Maşat höyük (Şenyürek, 1946) and the teeth of a cynodont individual from Karahöyük (Şenyürek, 1949) have already been published. This tooth from Maşat höyük is reprinted here (fig. 5).

[4] The teeth were x-rayed in 1945, 1946 and 1948, the x-raying of the last installment having been only recently completed. In this connection, I wish to

ans[5], coming from various sites and ranging from the Chalcolithic period to the end of the Ottoman settlement at Alişar höyük[6] have been x-rayed. This series, consisting mostly of permanent molars and some milk molars, represents almost all of the available ancient mandibles, with the only exception of a few new arrivals[7], preserved in the Department of Anthropology of the University of Ankara. A full report on this material is in preparation and all the pertinent questions will be discussed in detail in this coming paper, which will also contain the skiagrams of all the teeth x-rayed. In this preliminary report we shall confine ourselves to the statement of the general results of this investigation together with a brief survey of taurodontism in the species *Homo sapiens*. A number of skiagrams have been appended to this report (Plate I) which, I hope, will give a sufficient idea to the reader regarding the nature of the pulp chambers in the ancient inhabitants of Anatolia.

It is found that the size of the pulp chamber, in general, diminishes from the immature towards the old and worn teeth (See the plate). That is, during the life of a molar the size of its pulp chamber progressively diminishes. Courtney-Lyne (1916) attributes this process to age, while T. D. Campbell (1925) attributes it to the progress of attrition. The fact that during the life of a molar the size of its pulp chamber progressively diminishes must be taken into consideration in comparing the pulp cavity of one molar with that of another, as the comparison of an immature tooth with a mature one may give a totally erroneous notion. It may also be pointed out here that among the developing immature teeth also there is some variation in the size of the pulp cavity (Compare figures 1 and 2), as there is in the ma-

express my thanks to the administration of the Dil ve Tarih-Coğrafya Faculty of the University of Ankara for their aid and to Professor Dr. Efdal Aşar and Dr. Celâl Maral for taking the x-rays with care.

[5] In addition there are two numberless lower jaws of doubtful provenance.

[6] That is, roughly from the latter part of 4th millenium B. C. to 18 th. Century A. D.

[7] When these lines were written only some fragmentary crania from Yümüktepe had come. Since then, however, more material from Gözlükule and Kültepe have arrived.

ture teeth of comparable ages. As I pointed out before (Şenyürek 1939), a tooth that is going to be taurodont starts with a larger pulp chamber than the one that will develop into a cynodont tooth. The question of the reduction in size of the pulp cavity during the life of a tooth will be discussed in detail in the coming report.

It is also noted that in general the size of the pulp chamber progressively increases from the first to the third lower molar (See the plate). Therefore, in comparing the sizes of the pulp cavities of various individuals with one another, only the teeth having same number in the molar series should be compared with each other; viz., first lower molar with the first lower molar etc.

Among the ancient inhabitants of Anatolia both the cynodont and taurodont individuals are found. While, on the whole, the majority of the teeth are cynodont, still a large proportion of them display taurodontism. In the plate appended both the cynodont and taurodont teeth are shown, and the reader should compare them with each other. It is found that the taurodontism occuring in the ancient inhabitants of Anatolia is of a moderate degree, the size of the roomy pulp chamber of an immature individual shown in fig. 9 being about the largest.

We may now briefly survey the occurence of taurodontism in the species *Homo sapiens*, recent and fossil. G. S. Miller in 1918 had shown the occurence of taurodontism amongst the American Indians and the ancient Egyptians. I, too, observed its occurence in some individuals of these peoples and in addition in some ancient Icelanders, representing the medieval Europeans (See Şenyürek, 1939). J. C. M. Shaw (1928-1931) also has shown that taurodontism occurs in about 30 % of some South African natives. It is also found in the skulls unearthed at Mapungubwe in South Africa (Fouché, 1937, editor). The examples cited will suffice to show that outside of modern Europe traces of taurodontism are still found. Indeed, it is of quite frequent occurence in some peoples.

As for the fossil *Homo sapiens*, J. C. M. Shaw (1928) has already shown that taurodontism occurs in the fossil Boskop and Strandlooper types of South Africa. The fossil *Homo sapiens* from the upper cave in Choukoutien also is moderately taurodont (See Weidenreich, 1937, plate XXXIII, fig. 323). The pulp cavities

of Wadjak man also are larger than those of modern Europeans (See Weidenreich, 1937, plate XXXIII, fig. 316). The female of the Obercassel man (See Bonnet, 1919, plate XV, fig. 44), on one side, exhibits pulp chambers which are probably of a similar size. On the other hand, the Galley Hill and Combe Capelle men show pulp cavities which, though worn and probably somewhat reduced in size, are cynodont. In the literature there are other instances of fossil specimens with relatively large pulp chambers, but the examples given above will suffice to show that a moderate degree of taurodontism also occured in at least some of the fossil *Homo sapiens*.

Conclusion

In the ancient inhabitants of Anatolia, though the majority of the teeth are cynodont, still a large proportion of them display taurodontism of a moderate degree. Taurodontism is also found in other *Homo sapiens*, recent and fossil.

As it was stated at the beginning of this report, the old hypothesis, that the fossil hominids possessing taurodontism could not represent a stage in the phylogeny of *Homo sapiens*, was based on the assumptions that taurodontism did not occur in the Anthropoid apes and in modern man. But we now know that both of these suppositions are wrong.

On the other hand, the evidence we possess indicates that *Homo sapiens* is derived from a moderately taurodont ancestor and that during the course of evolution of the species the size of the pulp chambers have been reduced. But it is evident that this process of reduction has not proceeded at an equal pace in all the races, as some still preserve, or have at least till recently preserved, traces of a moderate degree of taurodontism.

Literature Cited

Adloff, P. (1907). *Die Zähne des Homo primigenius von Krapina. Anat. Anz.* XXXI, pp. 273 - 282.

Adloff, P. (1908). *Das Gebiss des Menschen und der Anthropomorphen.* Berlin.

Black, D. (1927). *On a lower molar hominid tooth from the Chou Kou Tien deposit. Palaeont. Sinica*, VII.

Campbell, T. D. (1925). *Dentition and palate of the Australian aboriginal. Keith Sheridan Foundation publ. No. 1, Univ. of Adelaide,* Adelaide.

Fouché, L. (editor, 1937). *Mapungubwe - Ancient Bantu civilization on the Limpopo.*

Keith, Sir A. (1913). *Problems relating to the teeth of the earlier forms of prehistoric man. Proc. Roy. Soc. Med., VI, Odontol. sect.*

Keith, Sir A. (1925). *The antiquity of man.* London.

Keith, Sir A. (1930). *New discoveries relating to the antiquity of man.* New York.

Lyne, C. (1916). *The significance of the radiographs of the Piltdown teeth. Proc. Roy. Soc. Med., IX, Odontol. sect,* pp. 33 - 51.

Miller, G. S. (1918). *The Piltdown jaw. Amer. J. Phys. Anthrop.* I, pp. 25 - 52.

Şenyürek, M. S. (1939). *Pulp cavities of molars in Primates. Amer. J. Phys. Anthrop.*, XXV, pp. 119 - 130.

Şenyürek, M. S. (1946). *Türk Tarih Kurumu adına yapılan Maşat höyük kazısından çıkarılan kafataslarının tetkiki. Study of the skulls from Maşat höyük, excavated under the auspices of the Turkish Historical Society. Belleten,* No. 38, pp. 231 - 242, 243 - 254.

Şenyürek, M. S. (1949). *Türk Tarih Kurumu adına yapılan Karahöyük kazısından çıkarılan kafataslarının tetkiki. Study of the skulls from Karahöyük, excavated under the auspices of the Turkish Historical Society. Belleten,* No. 49, pp. 1-10, 11-20.

Shaw, J. C. M. (1928). *Taurodont teeth in South African races. J. Anat.,* LXII, pp. 476 - 498.

Shaw, J. C. M. (1931). *The teeth, the bony palate and the mandible in Bantu races of South Afica.* London.

Verworn, M., R. Bonnet and G. Steinman (1919). *Der diluviale Menschenfund von Obercassel bei Bonn.* Wiesbaden.

Weidenreich, F. (1937). *The dentition of Sinanthropus pekinensis, a comparative odontography of the hominids. Palaeont. Sinica, N. S. D., No. 1,* (Whole series No.101), Peking.