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**In memoriam Dr. Tibor Tóth
(1929-1991)**

By I. Pap, Budapest

On the 3rd of October, 1991 a heart attack killed Dr. Tibor Tóth, Doctor of Biological Sciences and director (ret.) of Department of Anthropology of the Hungarian Natural History Museum. Hungarian anthropology lost one of the most significant scientists from the post-war period.



He was born in Szolnok, on the 5th of January, 1929. He attended elementary school in Szolnok, then he went to the Calvinist Grammar School of Mezőtúr (1939-1947). He graduated as one of the best in his class, and then he went to the Natural Sciences Faculty of the Eötvös Loránd University of Budapest. He spent his third year at the C. I. Parhon University of Sciences in Bucharest. He finished university as a museologist specializing for anthropology and the archeology of Ancient times in 1952. As one of the top students he was selected for postgraduate course at the Anthropological Department of the Lomonosov University of Moscow from 1954-1958. In 1958 he qualified for a candidate's degree with a dissertation titled "Horizontal profilization of the ancient and the present populations of Hungary as related to the ethnogenesis of the Hungarian people." He defended his thesis and graduated as Doctor of Biological Sciences in 1978. This dissertation was "Somatology and paleoanthropology of the Hungarians (to the problems of their origin)".

In July 1958 he joined the staff of the Department of Anthropology of the Hungarian Natural History Museum. He was promoted to leading research worker and then to deputy director in 1962. Tibor Tóth became head of the department in July 1965 and he kept his office till his retirement in December, 1990. He served as member of the Anthropological Committee of the Hungarian Academy of Sciences (1959-1990) and as member of the Committee of General Biology of the National Postgraduate Degree Granting Board of the Hungarian Academy of Sciences (1969-1984). He was the editor of *Anthropologia hungarica* from 1965-1990. He was member of the editorial board of the *Annales historico-naturales Musei nationalis Hungarici* (1965-1990) and of *Anthropologiai Közlemények* (1966-1991).

His main fields of interest were the evolution of Man, morphology and ethnic anthropology but first and above all historical anthropology of postglacial populations. As a scientist he worked not only in the silence of his office but also at a lot of excavations. He participated for expeditions in the Ural region, in the Caucasus and in Middle Asia (1959, 1962, 1964-1965, 1967-1968). He spoke excellent Russian and he was one of the first to establish strong links with Soviet fellow-scientists. He interpreted differential diagnosis of Mongolid and Europid findings according to their horizontal profilization of the face. These contacts helped him to analyse Bronze Age series from the Soviet Union and paleoanthropological material from Mongolia. The evolutionary problems of bone morphology and the significance of various characteristics also arrested his attention.

His international reputation spread both to the East and to the West as it is reflected by the fact that he was invited to 27 international conferences where he delivered 22 lectures.

Hungarian anthropology is deeply grateful to Tibor Tóth not only for his scientific activities but for his collecting drive as head of the Department of Anthropology of the Hungarian Natural History Museum. He continued the fine tradition set by his predecessor Prof. János Nemeskéri. Thanks to the several decades of efforts directed by them, the collection of the Hungarian Natural History Museum became one of the wealthiest collections of historical anthropology in Europe.

Dr. Tibor Tóth clearly recognized the significance of Hungary within the Great Migration and the duty to preserve as much of the human remains of our history as possible.

In his industrious life he published 126 articles in Hungarian, Russian, English, German and in French. Scientific periodicals of Hungary, of the Soviet Union, of Mexico, of Finland, of Italy and of East Germany published his works.

List of Dr. Tibor Tóth's scientific publications

by I. Pap and Sz. Makra, Budapest

1956:

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1957:

A szovjet antropológiai kutatások helyzetéről, II. [On the anthropological investigations, II]. — *Anthrop. közl.* 1: 61-66.

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1961:

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1963:

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Gesichtsprofilanalyse. — In: Dezső Gy. et al.: Die Spätmittelalterliche Bevölkerung von Fonyód. *Anthrop. hung.* **6**: 146-148.

Methodische Fragen in der historischen Anthropologie. — *Annl. hist.-nat. Mus. nat. hung.* **55**: 551-554.

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1966:

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1975:

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1981:

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The odontological aspect in the ethnogenesis of Hungarians, II. — *Annls hist.-nat. Mus. natn. hung.* 74: 351-357.

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Somatology and paleoanthropology of the Hungarians (to the problems of their origin)

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Abstract — The present English text of the author's doctoral thesis is the translation of the original work published in Russian, in Moscow, in 1977.

The dissertation proposes to elucidate the exceedingly intricate problem of the origin (ethnogenesis) of the Hungarian people on the basis of the estimation of anthropological materials.

Ethnogenesis may be considered a complex branch within the system of sciences - synthesis of anthropological, linguistical, histographical, ethnographical and archaeological data. Different interpretations evolved about the settlement and anthropological composition of the Proto-Hungarians as well as about their connections with other peoples in the eastern part of Europe and in the Central Danubian Basin in each discipline mentioned in the Hungarian literature.

The investigation and publications of L. Bartucz, P. Lipták, M. Malán, J. Nemeskéri, S. Wenger and others treated some questions of morphological composition of historical and recent Hungarians. Hungarian anthropologists examined further craniological finds from different historical periods of the Central Danubian Basin. The present dissertation is attempting to give a synthesis according to the aspects provided by the somatological and paleoanthropological materials originating from the territory of the Central Danubian Basin, as well as from other regions of the Eurasian continent.

The attempt for a wide comparative chronological and spatial analysis supports a better founded interpretation of the ethnogenesis of the Hungarian people, too. The dissertation consists of two volumes. In the first volume one can find the introduction and two main parts with ten chapters and a postscript (296 pages of ms text, 47 pages with references). 28 statistical tables are included on 49 pages. The second volume contains 36 statistical tables with somatological, odontological and dermatoglyphic data and 62 figures. In this volume we can find data on the origin of the studied material. The size of this second volume is 257 ms pages, whereas that of the complete work is 649 pages.

The introduction stresses the increasing significance of anthropology in the analysis of various questions concerning the origin of the Hungarian people. This is connected to the systematic introduction of the new methodological and methodic concepts adapted by the author from the works of the founders of the Soviet anthropological school. Many important questions are outlined as they came into the focus of the author's attention: anthropological characteristics of the various ethnogeographical groups of the Hungarian population, radiation area and periods of the formation of the morphological character of Hungarians, the pattern of mutual influences of Proto-Hungarians and the autochthonous groups in the Carpathian Basin and Central Europe.

PART I

SOMATOLOGICAL DATA

CHAPTER 1

MATERIAL AND METHOD

The author carried out investigations according to a project accepted by the Anthropological Department of the Ethnographical Institute of the Soviet Academy of Sciences and by the Anthropological Research Institute of the Moscow State University. 14 metric and 34 scopic anthropological traits were included in the project.

In five seasons material was sampled from 40 groups of the male population of Hungary (3310 individuals) and from that of the Soviet Union (1085 individuals). The traits were evaluated with every local group (4395 individuals) by the following parameters: case number (N), range of variation (min-max), mean value (M) with its error $m(M)$, quadratic deviation (σ) with its error $m(\sigma)$ and variation coefficient (V). Nine indices were also calculated: head-, jugo-mandibular, fronto-mandibular, facio-morphological and physiological, nasal from the edge of the eyebrow and from the nasal root and two variants of the lip-index. Some intragroup correlation coefficients were also calculated by eight pairs of characters. Statistical elaborations were done in the Computer Center of the Hungarian Academy of Sciences.

As it is known one of the fundamental criteria of field work done according to the rules of somatology is the application of a unified method in the determination of scopic and metric traits. The author obtained his experience in this field at a laboratory course directed by G. F. Debets.

CHAPTER 2

GEOGRAPHICAL DISTRIBUTION OF THE TRAITS

The different peculiarities of pigmentation body hairs and the structure of the upper eyelid are described and discussed in this chapter. Various measurements and the form of the face are also analyzed as well as the scopic and metric characters of the nose and lips, the morphological peculiarities of the chin and ear-flap, the measurements and the structure of cranium, stature and different indices are analyzed.

First of all the dominance of light skin colours deserves attention and the mixed shades of eye colours and the dark shades of hairy pigmentation in every local group of the Hungarian male population or in the majority of them. The simultaneous occurrence of dark hair and light or mixed colours eyes can be noticed among the variants of parallelism. The reversed combination (light hair with dark eyes) occurred very seldom. No zonality could be observed as far as pigmentation is concerned with the local groups of Hungarians as an entity.

Face and chest hair of Hungarians more moderately developed than the medium standard while eye-brows are more marked to a certain degree. No parallelism can be observed between the beard and chest hairs as well as the thickness of eye-brows with the majority of the local groups from Hungary. These local groups are mostly characterized by slightly wavy hair. Nevertheless stiff straight hair is also present with an unnegligible frequency (10%) in the middle of the Trans-Tisza region (Nagykunság).

As it is known the proximal part of the upper eyelid-plica can be regarded as a delimiting trait between components of the Europoid and Mongoloid great-races. One's interest can be aroused by the well expressed differences between the Hungarian local groups and the Sarykopian (Madiars, Kipchaks, Argyns)

of North-West Kazakhstan. The almost complete absence of epicanthus on Hungarian males is a fact of no lesser significance, too. The horizontal position of the eye slit axis and its medium width are dominant with Hungarian males. No parallelism between the traits mentioned could be observed.

The majority of Hungarian local groups is characterized by strong profilized face and by a slightly curved malar part. The almost singular presence of the Europoid component is reflected in these characteristics in all groups from Hungary studied by the author. The male population of Kazakhstan is characterized by significantly flat faces and by a strongly curved malar part in contrast to the Hungarians.

The overwhelming majority of Hungarian local groups may be characterized with medium values of the bizygomatic width and morphological facial height i.e. mesoprosopy. A tendency for leptoprosopy can be observed most markedly in the South-Western part of Hungary. Within the category of mesoprosopy three subdivisions can be identified. The low limit of this category can be found among the males of Northern Hungary especially within the group called Palóc. It is most manifested with some male groups from the transitional zones of the Eurasian continent as they bear even more manifested tendency for leptoprosopy than the local Hungarian groups.

Nasal index (from the lower border of the brows) reveals a rather heterogeneous picture in the ethnogeographical regions of Hungary. The local groups of the Hungarian male population studied by the author are characterized by leptorhiny on the whole. The minimal and maximal values of the second nasal index (calculated from the deepest point of the nasal root) were found in the Northern and South-Western parts of Hungary as well as in the North-East. Thus parallelism that is worth mentioning could be observed in the geographical distribution of both nasal indices. The same phenomenon was found on the Soviet male population studied by the author. Hungarians are characterized by medium high and high nasal roots. The straight form as well as the horizontal position of the nasal tip and the evolvated position of the nasal base are dominant in the general profile of the nasal ridge in Hungary.

The proportion of the medium position of the axis of nostrils exceeds 90 percents in almost all local groups of Hungarians. Beyond the dominance of oval shaped nostrils a significant percentage of the Hungarian male population can be characterized with the triangular form. A parallelism can be stated among oval shaped nostrils, medium expressiveness of the nostril wings and the medium inclination of the axis of nostrils.

The nasalo-ciliar distance as determined by the difference of the two nasal heights is more than 6-7 mm with Mongoloids as we know it. It is most symptomatic that even the greatest nasalo-ciliar distance of local Hungarian male groups is not up to the 5 mm standard that is up to the characteristic mean value of the Europoid great-race. The minimum values of this distance were found in the North-Western part of Hungary whereas the maximum ones in the South-West.

Relatively low metric and metric scopic values are prevailing among the data concerning lips in the majority of the local groups of the Hungarian male population. The Hungarian male population seems to be characterized by low and under average values. In the Soviet male population samples studied by the author the lips seem to be characteristic for nearly all of the local Hungarian groups and it is near to the medium thickness of the lower lips.

The Hungarian male population can be characterized by orthocheilia beyond a clearly observable proportion of the opisthocheilic forms. The procheilic form, characteristic for the representatives of the Mongoloid great-race, is almost completely absent in the Hungarian male population. The width of the mouth is represented by small low values in the male contingents investigated by the author in Hungary as well as in the Soviet Union. Hungarian males have a medium or strongly expressed chin. Strongly expressed chin can be found mostly in the Northern and Eastern groups of the male populations of Hungary. Absence of ear-flap is relatively frequent, but the lingual form seems to be much more characteristic.

According to the structure and measurements of the neurocranium, the head is characterized by brachycephaly, i.e. by its great width and small-medium length in every group of the Hungarian male population. A tendency for hyperbrachycephaly is also of some importance. The majority of Hungarian

groups studied are generally characterized by a quite narrow and medium inclined forehead. The slight form occurs with a significant frequency beyond this.

Weakly developed supraorbital zone prevails in every group of the Hungarian male population. All the Hungarian groups seem to be quite gracile not only according to the degree of the development of the supraorbital zone, but according to their extension from the median sagittals. The male groups of Hungary can be characterized by a medium and somewhat greater body length (166.0-170.6 cm). The minimal values of this trait have been found in the South-West, in Göcsej (Milejszeg), whereas the maximal ones in the North part of Hungary (Szendrő). As far as the geographical distribution of stature is concerned, accumulation of high stature persons can be observed in the Middle Tisza-region (Jászság and Southern Palócs with Matyós).

The Cis-Uralian and Kazakhstan foreign groups are characterized by somewhat smaller stature than the local groups of Hungarians. When considering all the groups studied, high stature characterizes the Southern Ossets.

The connections of some metric traits can be summarized in the correlation-coefficients between the longitudinal and transverse diameters. These are in Hungary: + 0.326.

The geographical distribution of these coefficients does not reveal any regularity and no parallelism with the cephalic index could be observed.

Having done a comparative analysis the highest positive correlation could be stated between the bizygomatic and mandibular diameters (for Hungary: 0.458). Body length seems to be to some slight extent stronger correlated with the morphological facial height (for Hungary: 0.294) than with the bizygomatic diameters (for Hungary: 0.211).

Similar correlations were found by Levin (1971) between body length and the measurements of facial skeleton in a very wide contingent of Japanese. It provided evidence for the larger Species unity of some representatives of recent Eurasian populations.

CHAPTER 3

CONNECTIONS BETWEEN THE EUROPOID AND MONGOLOID COMPONENTS

This chapter contains all material which helped us to elucidate the central problem about the main components of the Eurasian continent in the morphological composition of recent Hungarians.

The meaning of morphological peculiarities of Mongoloid great-race with a high frequency in the anthropological composition of the Hungarian people has a very long research history. Bartucz (1939, 1943) outlined some distributional loci of the "Mongoloid types" which are different to the Mongoloid ones, i.e. they are only "Mongol-likes". According to him the first of the mentioned loci is represented by the ethnographic zone of the Palóc situated in the Northern part of Hungary (the counties Nógrád, Heves and Borsod) where the frequency of the "Mongoloid types" is as high as 35-40 percent. The second locus of these types lies in the North-West Transdanubia where they are represented with a significantly lesser frequency. The Middle-Tisza region can be considered a third locus with the territories of Jászság and Kunság, with a not significant frequency.

Bartucz took into consideration some peculiarities of the face, of the pigmentation and body-height in the analysis of this problem. But he did not apply the ball scale-system in studying the scopic traits.

The author of present dissertation shares Debets's (1951) and Jarcho's (1934) views that the taxonomical value of some scopic traits is much higher than that of the metric traits in connection with their wide-ranging areality and philogenetical entailment. The following morphological traits were taken into consideration for the analysis of the Mongoloid character: beard growth, chest hair growth, frequency of epicanthus, expressiveness of the proximal part of the upper eyelid-plica, position of the eye slit, axis,

horizontal facial profile, prominence of the cheekbones, nasal root height, upper lip profile and expressiveness of the chin.

As a somatological scale for estimating differences by the ten mentioned morphoscopic traits, the distance between the values characterizing Pushtun of East-Afghanistan (settled, Host) and Central Siberian Tunguses were applied. Distance between these two groups were regarded according to every trait as 100.

Cumulative information is expressed about the relation of the two basic components, as the results of summarizing the ten above-mentioned morphoscopic patterns of the primary taxonomic range in the somatoscopic index of mongoloidity proposed by Debets.

As far as the main ethnogeographical groups of the male population of Hungary were concerned, we found that with the exception of two settlements of the so-called Göcsej (Kustánszeg, Petrikeresztúr) the index-value of mongoloidity scored 20.00 nowhere in the country, i.e. the lower value-limit of the transitional zone between the standard categories of Europoid and Mongoloid great-races. This somatoscopic index had its minimal value in the North-Western part of Hungary (Himód), whereas its maximal value was found in the South-Western part of Hungary (Kustánszeg). It seems to be an interesting fact that this index is characterized by a very low value in the well-known group of the Matyó - according to the data obtained from the male population of Mezökövesd.

In the zone of metisation of the two main races inhabiting the continent of Eurasia a peculiar gradient of the somatoscopic index of mongoloidity can be observed from the South-West to the North-East. The minimal value of this index seems to be characteristic for the Southern-Ossets, whereas the maximal one was found among the Sarykopian and Madiars and values standing near to theirs were observed with the Kiptshaks living in the same region. Some groups of the Bashkirs are characterized by a lower frequency of the Mongoloid component among Kazakhstanians. Comparing our Hungarian data to that of the population of Bashkiria it is clear that a significant difference exists between the Hungarian males and the inhabitants of the Southern Ural region. The opinion of various Hungarian research workers of earlier decades mentioned a significant proportion of Mongoloid elements within the composition of the Hungarian people, but it also must be regarded an erroneous conception.

In spite of the priority of the taxonomic value of scopic traits a certain amount of information can be deduced from the analysis of value differences of all metric traits, too.

The data calculated according to Student's formula made it clear that the local groups of the male population of Hungary significantly differ from the representatives of the transitional zone of Eurasia on the basis of all (or almost all) metric traits. The differences of Hungarian and trans-Uralian groups are especially marked. Nevertheless it deserves attention that the majority of Hungarian local groups revealed a well-defined proximity by the bizygomatic diameter to the Mean-Yaik and Kesse Tabuen samples from the South-Ural region. This not significant mongoloidity of these Ural region series as represented by their somatoscopic indices combined with their relative closeness in their bizygomatic values to those of Hungarians may reflect the existence of a quite ancient (Bronze Age) common substratum. This was preserved with the North-Caspian broad-faced Proto-Europoids.

When summarizing all the evidences it is clear that the taxonomic position of recent Hungarians seems to be in the closest connection to the various components of the Europoid race-stock.

COMPONENTS OF THE EUROPOID GREAT-RACE IN THE CENTRAL DANUBIAN REGION

This chapter is made up of four parts: "Connection between the Southern and Northern components", "Choice of the Central Danubian variant", "Regional territorial complexes", "The race-components of the Central Danubian region".

The somatological data were sampled by the author from local groups of the Hungarian male population that inhabit neighbouring territories (distances of locations varied between 20-60 km). Therefore the majority of the metric and scopic traits do not differ significantly. Nevertheless we must take into consideration that each local group represented one of the more important ethnogeographical zones of Hungary (Órség, Göcsej, North-West, Kunság, Jászság, Southern Palóc and Matyó groups, Taktaköz, Szamos region). The distances of these regions are quite large (80-200 km; 400 km) and marital contacts among these distant areas have a decreasing or non-existent significance.

On the contrary local groups from these ethnogeographical zones present significant anthropological differences and peculiarities.

This kind of comparison demonstrates the mutual influence of the Southern and Northern components of the Europoid great-race within the Central Danubian region. Some peculiarities were selected to make this relationship clear: pigmentation of eyes and hairs, degree of the development of the medial part of the upper eye-lid plica, chest hair, nose and forehead structures.

The frequency of light coloured eyes varied between 22% (Southern Palóc and North Hungarian Matyó group) and 52% (Göcsej and South-Western Hungary). 30% of the inhabitants of the Kunság and Jászság region have light-coloured irises. With the exception of minimum and maximum values the zonal distribution of the frequency of light-coloured eyes did not reveal any significant geographic differentiation. However, this pattern was dominant in two zones of West-Transdanubia (Göcsej and Órség).

As far as the mutual relation of the Northern and Southern components of the Europoid race is concerned, the fact, that mixed eyes have a higher than 50% frequency in the majority of ethnogeographical zones within Hungary, has a special importance. The historical process of biological metisation between the representatives of Northern and Southern Europoids, within the territory of the Central Danubian region is reflected in this fact.

Dark hair prevails in all the ethnogeographical zones and it is also an essential evidence. It deserves special attention that light-coloured eyes combined with dark hair occur only in the South-Western part of Transdanubia. Male population groups of the Central and Northern zones revealed the combination of dark hair with eyes of mixed colours. This fact also reflected the mixed anthropological composition of the male population of Hungary as studied by the author.

The significance of the geographic variability of the medial part of upper eye lip plica is reflected by the continuous growth of the percentage of its absence starting from the Northern Baltic through the Central Danubian Basin and to the Trans-Caucasus and Afghanistan (Estonians, Latvians, Lithuanians, Hungarians, Armenians, Tadshiks and Pushtun).

The author of the present dissertation analyzed material originating from 92 local groups of Europeans (9805 individuals) to represent the above-mentioned regions of the Eurasian continent. All these groups were sampled by the same research worker or by his colleagues achieving uniformity of method by regular consultations (Debets 1965-1968, Vitov, Mark and Tsheboksarov 1959). Hungarians take an intermediary position between Northern and Southern Europoids when put into the context of these foreign series. When considering the great contingent formed by all the comparable series, the intermediary position of Hungarians is reflected in their metisated character between the Northern and Southern component of the European great-race. Taking the Baltic series as conditional representatives of the Northern Europoids and the Pushtun groups as conditional representatives of the Southern Europoids the

Hungarian male population seems to feel a clear intermediary position as far as chest hair is concerned. The medium range of the beard growth of Hungarian males also reflects an intermediary position.

In addition to the general dominance of straight profile - except for the males of the Jászság - the convex form of the nasal bridge can be considered dominant over the concave one in all the ethnographical zones studied. The peculiar combination of ball-scales (2-1 and 3-2) was analyzed in correlation of the nasal tip and nasal base. When interpreting these phenomena we have to take into consideration that the nasal base of Northern Europoids is very often more elevated than their nasal tip (Debets 1951). As opposed to it the weaker state of development of the supraciliary region is dominant with Hungarian males and it may be considered not only a sign of general gracilization but that of the presence of the Europoid great-race, too. It can be established that the two main components of the Europoid race-branch are present in almost equal proportions in the anthropological composition of Hungarians.

When choosing the Central Danubian variant the insufficient difference presented by the majority of metric traits (T-criteria being smaller than 2 units) of the local groups of Hungarian male population was taken into consideration. The analysis of the geographical distribution of the given characteristics manifested a crossing similarity between the ethnogeographical zones. It deserves attention that according to V. V. Bunak's (1965) remark a difference of one unit which can be calculated for an index or any diametric difference of 2 mm as well as a difference of 10% for a given unit exists between the distant zones of Hungary of our days. However, these differences are not concentrated according to the same ethnogeographical zones. The difference of individual ethnographic zones can be classified significant when indices produce a difference of one unit or absolute values that of 2 mm or 10%. As far as the scopic traits are concerned the minimal values do delimit the male population of the (Cis-Szamos river, Szamosmellék) Szamos-region and the Southern group of Palóc (included Matyó groups), Órség, Taktaköz, Jászság and the North-Western group, whereas maximal values are characteristic for Órség, Göcsej, North-West group and Jászság.

However, minimal values are characteristic for the metric traits of Szamosmellék, the North-Eastern Palócians, the North-Western groups, Taktaköz and Órség whereas maximal values - the Southern Palóc (included Matyó), Órség, Kunság and Szamosmellék.

The Central Danubian variant chosen by us is characterized by the dominance of dark hair and mixed coloured eyes, by medium developed beard-growth, by relatively weakly developed chest hair, by the not significant percent of the absence of the medial part of upper eyelid-plica, by the straight nasal bridge. Light shades of the eyes area significantly prevailing over the dark ones. The Central Danubian variant is characterized by well-expressed brachycephaly, mesoprosopy keeping quite near to narrow facedness, leptorhiny and medium tall body on the basis of the metric traits.

According to the majority of the traits studied this variant is located between the limits of the values characterizing the Central European race. As it is known this race represents a synthetic group of a number of variants (Roginskiy and Levin 1955). However, the Central Danubian variant seems to be a little different to the Central European race having higher and wider face. First of all it belongs to the bizygomatic diameter presenting an increase of values from the West to the East i.e. it has a limiting role in the relation of Alpine, Carpathian and Pontic zones.

Three territorial complexes were selected in the Central Danubian variant. The South-Western one of these complexes is characterized by the great proportion of light eyes (50 percent), by the dominance of individuals having dark hair (70-80 percent), by the high percentage of the absence of the medial part of upper eyelid plica, by medium developed chest hair and beard as well as by the dominance of convex nasal bridge over the concave one. Medium tall stature (168-169 cm) is characteristic for this complex as well as the greatest diameter (approximately 128 mm) of the morphologic facial height, medium size diameter (143-144 mm) of the bizygomatic breadth, the mesoleptoprosopy (88-89), maximal size of the transversal head diameter (158 mm) and well expressed brachycephaly (84-85) and leptorhiny (indices calculated from the lower biciliar diameter about 60).

The North-Western complex differs from the one mentioned in the dominance of the mixed shade of eyes (64%), in the maximal beard growth among Hungarians (ball 2.98) in the highest percentage of the convex nasal bridge (24.6%), in the somewhat smaller stature (167.4 cm), in the lower face (125.3 mm), in the smallest bizygomatic diameter (141.9 mm), in the minimal size of the transversal diameter of the head (155.4 mm) and in a reduced brachycephaly (82.9).

The central anthropological complex inhabits the Tisza basin mainly. The dominance of eyes with mixed shade is characteristic for this complex (50-60%) as well as that of dark hair (70-80%) and the dominance of the straight nasal bridge over the convex and concave ones. Stature is moderately tall (168-170 cm) and chest hair is somewhat weaker developed than that of the previous complexes. Beard growth seems to be quite significant (2.71-2.94) in this complex. The central complex is characterized by a lower face (125-126 cm). The bizygomatic diameter reaches its maximal value (143.5-144.6 mm) with this complex. Mesoprosopy is characteristic (86.2-87.2) and it is close to the minimal value of leptoprosopy. The transversal diameter of the head has a high value (157-158 mm), as in the South-Western complex. Some mosaicity can be observed according to the head-index (83.6-85.2). It deserves attention that the somatological characteristics of this central complex could be found in the male population of the six ethnogeographical zones of Hungarians. A determining role of the central complex is reflected by the comparative analysis in the formation of the Central Danubian variant.

Hungarian specialists (Bartucz, Lipp, Nemeskéri, Farkas & Lipták made use of the typologizing methods elaborated by the research groups of Eickstedt and Tshakanovksy in the evaluation of the anthropological composition of recent Hungarians. The possibility of the definition of race-characters of a given individuum is implicated in these methods but the neglect the territory-bounding of the given racial types (Bunak 1971). Nevertheless the typologizing methods can be considered worn out according to the principals elaborated for race-analysis (Jarcho 1934, Debets 1954).

As far as the possibility of the existence of some race-components (or elements) is concerned in the territory of the Central Danubian Basin the author carried out wide-ranging analyses with two criteria in mind: the compactness of the distribution of certain somatological traits and the degree of their geographic coordination. When approaching the situation this way it could be stated that the territorial complexes constituting it within the limits of the Central Danubian variant contained the components of the Pontic, Noric, Dinaric and Alpine races. Most significant of these is the Pontic race which is present in its North-Caucasian variant in the central anthropological complex of Hungarians but it occurs in both eastern complexes of the country, too. The Nordic race-type is concentrated first of all in the Northern part of German Tirol in the dolina of Lech along the Voralberg frontier and the upper reach of the river Dráva (Tseboksarov 1941). It seems to be present mainly in the South-Western and North-Western complexes of Hungarian males. We have to mention that the Dinaric and the Alpine components are present only in subordinated character in all these complexes.

The Central Danubian variant represents a peculiar concentration of the different characteristics of the two main Southern and Northern components of the Europoid race-stock in the quite complicated anthropological composition of the Hungarian people. Though no area within the territory of present Hungary can be identified with this variant the complexes constituting it are distributed according to the local and zonal groups of Hungarians.

CHAPTER 5

COMPARISON OF THE RESULTS YIELDED WITH THE DATA OF ETHNIC ODONTOLOGY AND DERMATOGLYPHICS

The author of this dissertation sampled data simultaneously from the male population of the same Hungarian local groups and these data were investigated somatologically as well as starting from the very significant race-diagnostic values of some odontological patterns systematically analyzed by Zubov (1966, 1968, 1973) according to a shortened program. The form of lingual surface of the upper medial incisors of 2219 adults was investigated. The number of persons whose lateral incisors were also investigated was over 2000 (2060). The lingual surface of the upper incisor is more often investigated in a four-ball scale (0-3). As far as the odontoscopic material of Hungarian males is concerned, it can be stated that the two first forms (0 and 1) are significantly dominant over the two others (2 and 3) according to the local groups in the case of the lingual surface of the upper medial incisors. The semi-shovel (form 2) and the shovel (form 3) incisors can be regarded one of the best odontological patterns characterizing representatives of the Mongoloid branch of mankind (Hanihara 1966). The increased frequency of semi-shovel form incisors as opposed form 3 to seem to be characteristic for all the local groups of the Hungarian male population studied. A very high frequency of shovel shaped incisors were found by Zubov (1968) in some Europoid groups (Oraons, Munda, Santals) of the Indian subcontinent. It seems to have a great significance that the Hungarian groups studied are far not only from the Mongoloids in general but from the Kazahs of a metisated Euro-po-Mongoloid origin, too.

The same conclusions could be achieved when the frequency of the distal trigonid crest was analyzed on the first lower molar.

On the basis of our comparisons we can state that according to a special combination of odontological and somatological traits the marked dominance of different components of the Europoid race-stock no doubt existed in the mosaic composition of the male population of Hungary.

A synthesis was produced not long ago (Roginskiy 1970). According to it the dermatoglyphic data of the hand may provide some support for making certain questions of ethnogenesis clear. This possibility was already demonstrated by Gladkova (1966). She was the first to collect a large number of data on the distributional frequency of epidermal characteristics of different peoples of the Earth.

The author of the present dissertation kept in mind the significant comparative value of dermatoglyphic traits and he sampled data from the male population of Hungary following the same local groups that were utilized for somatological and odontoscopic investigation, too. The contingent of Hungarians studied by their ethnic dermatoglyphic traits contained more than 3000 individuals. To make the relationship of Europoid and Mongoloid characters data were analyzed from the following regions: Órség (combined groups), Milejszeg (Göcsej), Kunhegyes, Jászapáti, Mezőkövesd (Middle-Tisza region), Himód (North-West), Taktabáj (Taktaköz), Gacsáj (Szamosmellék).

Among the eight dermatoglyphic series (approximately 900 persons) that of Taktabáj, seems to be a separate entity on the basis of some Mongoloid characters: A lower frequency (48.79%) of ulnar loop, a higher frequency (41.74%) of whorl and a graduated Furu-hata-index (78.48%) (Gladkova & Tóth 1973). As it is known the value of delta-index with Europoids varies between 10.77 and 14.65 (Gladkova 1966). The minimum and maximum of this index in Órség and in Taktabáj (12.90-13.66) falls between the limits mentioned above. We have to point out that the highest values of the delta-index (higher than 13.22) could be found within the area of the Europoid branch in the different ethnic groups inhabiting South-Europe, the Caucasus, West-Asia and India. The local groups of Órség of Kunhegyes and of Taktabáj produced Dankmeier indices falling between the variation limits characterizing Southern Europoids. The dermatoglyphic traits also left no doubt about the dominance of the elements of the Europoid great-race within the Central Danubian variant in general. Whereas a sufficient role of the Southern Europoid component is also partially evident in the formation of the physical outlook of recent Hungarians.

The peculiar combination of the somatologic, odontologic and dermatoglyphic traits present in the area of the Central Danubian variant may point to the manifestation of some quite ancient substation factors in the ethnogenesis of the Hungarian people. Further wide-ranging analysis of the paleoanthropological material is required to clear these problems.

PART II

PALEOANTHROPOLOGICAL DATA

CHAPTER 1

METHODICAL PROBLEMS AND MATERIAL

This chapter is made up of three parts: "The significance of paleoanthropological material for ethnogenetical research", "A short review on the paleoanthropology of Hungary", "The paleoanthropological series studied".

The mosaicity of the anthropological composition of recent Hungarians was determined by several ethnohistorical events. We also have to take into consideration the fact that not only the dolinas of the greater rivers of the Central Danubian Basin (Danube, Tisza, Dráva, Maros) but the hydrogeographical system of the Carpathian Mountains massive also promoted the wanderings in different historical periods and all these factors contributed to the transmigration of some tribal groups.

A number of archaeological finds confirm the fact that the Central Danubian Basin was continuously inhabited from Neolithic times till the Hungarians' settlement in the 10th century. The question of the relation between the massive and gracile components of the Europoid race-stock as observed on the paleoanthropological material seems to be essentially important in this aspect. The problem of the presence of the elements of the Mongoloid great-race in the exterior of Avars and of ancient Hungarians infiltrating the Central Danube region is of no lesser importance. One of the more significant questions concerning the ethnogenesis of Hungarians is the possibility of selecting some regional paleoanthropological complexes that existed within the Central Danubian Basin in the second millenia.

No doubt, the mosaicity reflected in the anthropological composition of recent Hungarians was influenced by some microevolutionary processes. These processes were analyzed on craniological series of historical populations which inhabited the Central Danubian Basin in the past

The very considerable craniological collection of the Anthropological Department of the Budapest University was established as a result of the scientific activity of A. Török (1842-1912). This wide-ranging contingent of finds (more than 10.000 crania) mostly dated in centuries not far from our days (18-19th c. A.D.) seems to be only marginally suitable for comparative analysis.

The largest contingent of paleoanthropological material is in the possession of the Anthropological Department of the Hungarian Natural History Museum in Budapest thanks to the activities of L. Bartucz (1920-1940) and J. Nemeskéri (1940-1965). These craniological series originate with more than 12.000 individuals. Their times-span is wide from the Neolithic to the present. We can find another collection in the Anthropological Department of the Szeged University (more than 7.000 individuals). This material was collected under the direction of L. Bartucz and P. Lipták in the last half century. It must be taken into consideration that the preponderant majority of the various craniological series originating from the periods of the Avar Khaganat and from that of the Arpadian dynasty is strongly connected with the excavation

activities of Hungarian archaeologists. These activities were concentrated to make several problems of the ethnogenesis of the Hungarian people clear.

The methodological niveau of the investigations carried out was a not less significant precondition of the results produced by Hungarian anthropology beyond collecting a wealth of finds.

Between the years 1920 and 1960 special attention was focused on the visual-typologic definition of the given objects. Nevertheless the general biological significance of the variability, areality as well as the taxonomic unequivallence of the characters of any paleoanthropological series left typologizing out of consideration. The selection of the Arctic type in the anthropological composition of some individuals from the period (Bartucz 1936) and the selection of more than 300 "type-elements" from some Medieval Hungarian series represented only by a small number of individuals (Nemeskéri & Deák 1956, Acsádi & Nemeskéri 1959) can be mentioned as examples for the overestimation of typology. It must be taken into consideration that race-types are not characterized by singular traits but by various complexes of certain traits and that the race-complexes of certain traits characterize a whole group of the population only in a given historical period and not with all individually existing persons.

The author analyzed various cranial series originating in the territory of the Central Danubian Basin and he kept in mind the race-diagnostic value of certain craniomorphological traits: cranial index, bizygomatic diameter, fossa canina, convexity of os malare and shape of the incisura maxillo-malare (Tóth 1962b, 1964, 1967a, 1968b, 1970d).

The craniological series investigated came from the following periods: Neolithic and Bronze Ages, Sarmatian, Late Roman and Avar periods as well as recent times. All these material was recorded first in the present dissertation. Nevertheless we have to mention that the analysis of some problems were founded only on a relatively small case number (279 crania from both sexes). The main reason of this is the wide chronological diapason. The summarized representative series of Hungarian crania originating from 42 tenth century localities was evaluated and studied by G. F. Debets in detail.

The analysis of certain trends and characters of epochal changes has the greatest informative value for clearing the problems of race- and ethnogenesis. The author utilized two summarized indices: praeauricular-faciocerebral connection and the flatness of the facial skeleton. His own data were complemented with those of other Hungarian and foreign specialists. The connections between brachycephalization, the measurements of the facial skeleton and brain case as well as the amplitude of the variability of some craniological traits were analyzed by him. The total paleoanthropological material originating in the territory of Eurasia consists of approximately 300 series (13.000 crania). There are about 2.500 crania (more 70 series) among these from the territory of Hungary.

CHAPTER 2

CRANIOLOGICAL CHARACTERIZATION OF THE SERIES INVESTIGATED

This chapter contains the scopization of the finds from the Neolithic and Bronze Ages, from the Sarmatian, Late Roman and Avar periods as well as those from the Hungarians of the 10th century and the crania of recent Hungarians. Characterization was done according to all the more important craniometrical and two scopic traits according to categories found in the tables of the mean value limits calculated by G. F. Debets.

If the anthropological heritage of Hungarians occupying the Central Danubian Basin in the 10th century seems to have a central part in the subjects chosen by us than it is advisable to concentrate our attention on the summarizing characterization of our representative contingent. That is ancient Hungarians had a medium long, brachycran skull (males revealed a tendency for mesocrany). They had a moderately broad but quite arched i.e. moderately bent forehead according to the adequate index. That of men had a medium developed glabella while that of women a quite weakly developed one. The facial height was

medium (with a tendency towards the category of great measurements) and broad eury-mesoprosopic opistho-orthognath according to the general angle of the vertical profile of the facial skeleton. It had a moderately medium deep fossa canina. Though the female groups revealed certain deviations towards Mongoloid patterns on the basis of the extent of the zygomatic angle the face of ancient Hungarians seems to be profiled in the horizontal plane in general. Thus ancient Hungarian populations were characterized by the morphological peculiarities of the Europoid race-stock according to the important traits of the horizontal profile. Their nose had medium height, medium breadth, was mesorhynic (with some tendency for leptorhyny with males) with a strongly anthropine form of the lower edge of the apertura piriformis. Orbits are medium wide, lower with men, medium high with women. However, height measurements are quite identical for orbits of both sexes, they are chamaeconch but very close mesoconchy.

CHAPTER 3

SOME MICROEVOLUTIONARY PROCESSES

This chapter comprises two parts: "On the time-span and character of assimilatory processes" and "The main trends of changes".

The Europoid physiognomy of the ancient Hungarian population was clearly reflected by comparative-morphological analysis. However, linguistical data does not conform with the main anthropological of ancient Hungarians settled down in the Central Danubian Basin. The key issue is that the linguistic "relatives" of Hungarians, the Ugors of West-Siberia (Hantis and Manshis) belong to the Uralian race being metisated descendants of Europoid and Mongoloid components. We must consider again the fact that the Mongoloid race-stock is quite significant within the composition of the Uralian race (Debets 1951).

However, our present knowledge makes it impossible to neglect the hypothesis of the Ugric origin of the Hungarian people. The author followed the metisation processes of the morphological peculiarities of the facial skeleton from the Bronze Age to the end of the Neometallic period. The craniological series originated in five contact zones between the area of the Europoid and Mongoloid great races. These zones were: the Altay-Sayan mountains, Kazakhstan, Kirgisia, the Ural-Caspian region and the Kama basin. The time span of the assimilatory process was traced according to important race-diagnostic characters constituting the facial flatness index like nasomalar, zygomaxillary, nasalspine angles, dacryal and simotic heights (Debets 1957, 1961b).

It could be stated that the morphological transformation of the facial skeleton took a time interval of 1-1.5 thousands years in case of the assimilation of Europoid or Mongoloid characters on the basis of anthropometric and biometric data. However, this time interval does not seem to be long enough for the complete disappearance of one of the basic components. We can suppose that the period mentioned is to be interpreted as a rough estimate and it is probably sufficient only for the dominance of any of them. As far as the morphological structure of facial skeleton is concerned, the pace and limits of epochal transformation (i. e. assimilation) were conditioned by various social and biological - environmental factors (population density of the given tribal-clanic groups, dynamism of fertility within the interval of 35-45 generations, frequency of marriages between representative of the Europoid and Mongoloid races, food, climate, chemical composition of soil, etc).

The fact that in spite of the millennia long Hunic-Turkish rule of the North-Caspian region the dominant frequency of Europoid characters did not alter significantly seems to have special importance in outlining the limits of the early period of Hungarians' ethnogenesis. As far as the expressiveness of the Mongoloid component is concerned, the craniological series of Conquering Hungarians are far from the cranial series of Bahmutino culture (1st millennia B.C.) and that of recent Mansis in the period when they settled in the North-Caspian region's Sarmatian environment. The same can be stated when comparing the

G. F. Debets (1962, 1964, 1968) elaborated a method for the calculation of the praeauricular-faciocerebral index in the comparative analysis of the measurements of the facial skeleton and the brain-case. The denominator consists of the sum of three measurements of the four parts of the brain-case (length of basicranium, smallest width of forehead and basion-bregma height), whereas its numerator consists of the sum of three measurements of the splanchnocranium (base length of the face, bizygomatic diameter and height of the upper face). The combined facial flatness index and the praeauricular-faciocerebral index expresses the topographical coordination of given craniological series - that is the trends of epochal changes can be followed. The indices mentioned were determined by the author of this dissertation for 134 craniological series from the territory of the Soviet Union and Iran as well as for 53 series from Hungary.

The topographical disposition of the anthropological finds of tenth century Hungarians invading the Central Danubian basin deserves special attention. The closest to them is the material of the Andronovo culture excavated in Eastern and Central Kazakhstan. On the other hand, they present a significant deviation from the Late Bronze Age cranial series of the Middle-Ob region. The group of Conquering Hungarians is much more similar to the Sauromats and Sarmatians of the Lower Volga region than to the series excavated from the cemeteries of Bolshe-Tarhan or the ones from the Kama basin (Pianobor, Mazunino and Lomovatovo cultures) as well as to those of Bashkiria (Biktimirovo, Kamueshluetamak cemeteries). On the other hand the Conquering Hungarians are closer to the Sauromats and Sarmatians of the Lower Volga mentioned above than to the craniological series of the Scythians inhabiting the steppe and forest steppe regions of the Ukraine. The summarized group of 10th century Hungarians can be clearly separated from all finds originating in the Transdanubia of the Roman period as well as from the Sarmatian finds from the Central Danubian region. The craniological series of the Tshernigov and Pereyaslav Polians are much more similar to that of tenth century Hungarians than to certain groups of the ancient population within the territory of present Bulgaria. Nevertheless this proximity is not that expressed as the one between the series of Conquering Hungarians and Sauromato-Sarmatians. Sauromato-Sarmatians supposedly played the part of substrates in the formation of the main morphological peculiarities of the precursor of the Hungarian people. The representative series of Conquering Hungarians reflected a great distance not only from the craniological material originating from the Ananinoians of the Lugovo cemetery (Cis-Ural) but from the combined Early and Late Iron age series excavated in the Trans-Ural region (Kurgan district and Middle-Ob region). The group of the precursors of recent Hungarians (as it is visible in the correlation field) was similar not to the nomads but to the series of the Sarkel great kurgan. Tenth century Hungarians were dissimilar to the craniological series of recent Kazakh, Uzbegs, West-Siberian Ugors, Tshuvash, Bashkirs and Eastern Finns but we found similarities to the representative series of recent Ossets from the Northern Caucasus. This sort of correlative relationship confirms the significance of the common Sauromato-Sarmatian substrata, which had a decisive role in the genesis of the anthropological features of Medieval Hungarians as well as in that of contemporary Ossets.

We coordinated the praeauricular-faciocerebral index with the facial flatness index. These indices could be calculated for a wide craniological contingent of the Avar period (1248 crania) excavated on 33 sites of the Central Danubian Plain. This way valuable information can be obtained on the main trends of intraspecific epochal changes. This information made regional correlations among various groups of a certain historical population quite expressed. All the representative Avar period series bear Europoid characters with strongly profilized faces and with relieves gracilized to different degrees. The finds of Mosonszentjános and Budapest-Népföld (both are sites of small sample size) are comparatively close to the summarized series of the Mongoloid racial-stock. The most Mongoloid-like is the Avar series of Kiskőrös-Vágóhíd (with small sample size) from all the Avar series.

The topographical proximity of the finds of the cemeteries of Alattyán and Homokmégy-Halom, Kiskőrös-Város alatti and Üllő II, Jánoshida and Dunaszekcső, Előszállás and Ártánd, Szenteskaján and Tiszaderzs, Szellő and Bányog-Gyűrhegy, Szabény I and Csákberény, Csákberény and Kiskőrös-Város alatti, Üllő II and Dunaszekcső furnish convincing information on the strong dominance of the Europoid peculiarities within the wide masses of the population of the Avar khaganat. The Europoid component also

Üllő II and Dunaszekcső furnish convincing information on the strong dominance of the Europoid peculiarities within the wide masses of the population of the Avar khaganat. The Europoid component also seems to be clearly dominant in the enormous series of the Üllő I cemetery. The most hypermorph groups of the Europoid groups of the Avar period are the ones from Ellend II, Kékesd and Környe from the Transdanubia.

Great morphological similarity can be found among the finds from the cemeteries of Szob-Homokok, Jutas, Szentes-Kaján Tiszaderzs and the craniological series from the West-Caspian Mingetshaur (Catacomb burial period) as well as from the cemetery of the Ukrainian Saltovo. The great distance of the preponderant majority of the Central Danubian Avar period finds of all craniological series from the ones originating in the Hun (Tashtuek) and Turkish period of the Minussinsk basin, the Altay-Sayan mountains and Kazakhstan is by no means out of interest from ethnogenetical point of view. The very marked similarity of the anthropological material from the cemeteries of Váchartyán and Üllő I to the West-Kazakhstan Sarmatians' representative group can also be mentioned in this context.

The morphological comparison gave evidence supporting the fact that the preponderant majority of the Avar Kaganat's populations had a physiognomy somewhat more gracile and they had more profilized faces. The Avar period aborigines inhabiting the Central Danubian Basin bore more of the morphological peculiarities of the Southern (hypomorph) Europoids than of tenth century Hungarians.

CHAPTER 4

FORMATION OF THE CENTRAL DANUBIAN VARIANT

This chapter consists of seven parts: "Intergroup variation of some craniometrical traits in the Central Danubian region", "Comparison to the materials of the Eurasian continent", "Relationship between the hypermorph and hypomorph components in the Central Danubian region", "Epochal changes of the craniological complexes patterns in the Central Danube region", "Distribution of the craniological complexes in the Central Danubian region", "Secondary race-components in the Alpine-Carpathian area".

We applied the geographical method as the basic one to clarify the formation of main morphological peculiarities of recent Hungarians. The author made use of the Avar Period craniological series which were completely Europoids according to the expressivity of the flatness of the facial skeleton (425 male crania from 14 sites). All main geographical regions (Transdanubia, Danube-Tisza interfluvial, Trans-Tisza, Great Plain) are represented in this contingent. The most representative of these contingents is the one originating from the first centuries of 2nd millennia A. D. (757 male crania from 28 cemeteries). The regions of North-Hungary and the Southern part of the Trans-Plain are outlined besides Transdanubia and the Danube-Tisza interfluvial. When comparing with the Avar Period ones, the summarized group from the Transdanubian Late Roman Period has been combined with a small case-number series of crania from the Central Danubian Sarmatia.

The essence of the geographical method is the evaluation and investigation of intergroup variability. It was focused to establish the differences between the maximal and minimal group values of the craniological traits which were given in the percentages of the minimal mean-values. The efficiency of this method was analyzed by Ya. Ya. Roginskiy (1954). The intergroup variability of traits were evaluated in correlation with the intra-group variability. The author used the values of the variation coefficient calculated on Norwegian male cranial series from Oslo (Schreiner 1939) as standard value.

The data from the Avar Period and from the epoch of Arpadian dynasty produced a gradient showing decreasing mean value of the transversal diameter, of the nasal width of the cranial, height-longitudinal and nasal indices from the West (Transdanubia) to the East (Trans-Tisza, however the southern part of the Trans-Tisza Plain), whereas the mean value of the bizygomatic diameter and that of the upper-facial height as well as the values of upper-facial and of orbital indices were increasing.

orbital height and in the nasal breadth with their related indices. These are followed by the bizygomatic diameter, the upper facial height, the upper facial and cranial indices, the transversal diameter and the height of cranium as well as its height-longitudinal index and the longitudinal diameter.

When analyzing the intergroup variability of the trait complexes it could be observed that the Avars from the Danube-Tisza interfluvial were more uniform than the Avars from the two other regions. The Arpadian epoch Hungarians inhabiting the interfluvial were heterogeneous to a higher degree than the Avars from the same region. The level of variability can be regarded more or less similar to Transdanubia from the Avar Period to the 13th century. Such significant changes may probably be connected with the appearance of the Conquering Hungarians. The Arpadian epoch population of Transdanubia seems to be more variable on the basis of its craniological peculiarities than the inhabitants of the southern part of the Trans-Tisza Plain in the same epoch. The population of Arpadian epoch North-Hungary reveals a higher degree of heterogeneity than the Hungarians who lived in the southern part of the Trans-Tisza Plain in the same period. It can be established that with the exception of the relatively homogeneous population of the southern parts of the Trans-Tisza Plain, all inhabitants of Hungary from the Arpadian era reflect heterogeneity of approximative equal degree. Recent period Hungarians seem to be more homogeneous than the summarized groups from the end of Medieval times.

The geographical and epochal variability of the trait complexes was predisposed not only by the immigration of Conquering Hungarians. The proportions of the dolichocran, narrow-faced and leptorhynch elements (hypomorphic after the N. N. Tseboksarov's terminology, 1935) was significantly higher in the composition of Late Roman period Transdanubians than in the Avar period population from the same area. The summarized group from Late Roman period of Transdanubia contains hypomorphic components finding its analogies in the series of the Roman period male crania found in Switzerland.

The absolute values of the trait complexes convincingly reflect the dominance of the hypomorphic component in the composition of the Halstatt and La Tene epoch populations inhabiting the East-Alpian zones bordering on Transdanubia. Thus the hypomorphic component was one of the determinant in the formation of the Central Danubian variant already in early and late Neometallic times. The elements of the massive Protoeuropid component might have infiltrated into the Alpine-Carpathian (Central Danubian) area of quite gracile Mediterranean forms during the Neolithic and not only from the Atlantobaltic North but from the Ponto-Caspian zone of East-Europe, too.

The summarized group of the final Medieval population and contemporary Romans seems to be different according to the amplitude of the variability of their craniological traits from the Arpadian epoch series of the southern parts of Trans-Tisza Plain and North-Hungary, and from that of the summarized group of contemporary Hungarians, too. It can be stated that in the Central Danubian region race-formation processes of the 2nd millennium followed a pattern differing to the ones which took part in the eastern and southern Carpathian region.

The increasing tendency of the intergroup variability of trait complexes begun in the Late Roman-Sarmatian period and went on during the Arpadian dynasty period when the degree of the heterogeneity reached its maximum. Such a marked change of the epochal variability seems to be connected with the appearance of Conquering Hungarians in the Carpathian Basin first of all. The great values of the bizygomatic diameter and the ones of the upper height of the facial skeleton of the ancient Hungarian male population provide evidence supporting the infiltration of the massive Proto-Europoid component from the Ponto-Caspian zone of East Europe into the Central Danubian Basin. It seems to be of great significance that the arithmetic mean-values of the craniological series of Conquering Hungarians were closing on the upper limit of the value-amplitudes of the Sarmatian groups from the Lower Volga, the Ukraine and the southern Cis-Ural region.

During the last one and a half millennia the diapason of intergroup variability became narrower according to nearly almost all craniological traits in the summarized series of the final Medieval times and contemporary period male crania of the Central Danubian region. Nevertheless the decrease of variability observed is not significant as its parameters exceed the homogeneity level. It can be noted that the

narrowing of the diapason of intergroup variability in the last centuries did not bring about the cessation of the general heterogeneity of recent Hungarians' anthropological composition. This is the reason why the centuries passed were not sufficient for the formation of a unique anthropological type of living population in spite of the comparatively small area of the Central Danubian Basin. Consequently a quite slow speed of race forming processes in the morphobiologic sense was dominant in comparison to the accelerated historical changes taking place in the last millennia of human society.

Thus it can be stated that the dominance of gracile narrow-faced peculiarities was significantly decreased after the infiltration of the Conquering Hungarians into the Central Danubian Basin and they have been balanced by the complex of massive broad-faced forms. The further formation of a Central Danubian variant was predisposed realizing the special amalgamation of Mediterranean and Proto-Europid race-components in the last one and half millennium up to the development of the regional complexes forming the somatological composition of the Hungarian people.

It could be stated (Alexeeva 1966) that the more significant traits cannot be utilized independently. The author of the dissertation analyzed the complexes of lesser or more independent traits keeping in mind the interpretation of positive correlations given by Ya. Ya. Roginskiy (1954) and I. I. Alexeeva (1966) for the inhabitants of Europe after comparing a wide-scale of craniological material from the Middle-Ages. These were for example the hundredfold cranial height divided by half of the sum of maximum length ad breadth; hundredfold upper facial and orbital height divided by cranial height - on the other hand those which stand in an opposite physiological connection (nasal breadth - facial breadth) with each other. Connections of this nature were determined on chronologically different series of the Eurasiatic continent from the Mesolithic to Modern times. The degree of craniomorphological nearness existing between the simultaneous groups as the regional trends of main race-genetical changes can be stated on this basis. That is a high degree of similarity can be established between the Bronze Age groups from the Lower Volga and Kazakhstan. The mutual race-genetical relations between the groups mentioned indicated special interest concerning the earliest periods of the formation of anthropological habits of Proto-Hungarians.

The analogies of the correlations of craniological complexes were also present in the Alpine-Carpathian area during the Neolithic, the Paleo- and Neometallic periods. There is a proximity of the summarized Avar period cranial series of the Danube-Tisza interfluvial to the summarized Sarmatian series of the Cis-Ural region. The Sarmatian series of the Cis-Ural region reveal the maximum closeness to the summarized Avar period groups of the Trans-Tisza Plain on the basis of the correlation of the hundredfold orbital height divided by cranial height as well as that between nasal breadth and bizygomatic diameter. Conquering Hungarians are more similar to the series of Medieval males who lived in the Arpadian Period than to that one in the Avar Period according to the correlations mentioned last.

The comparisons applied outlined transgressive analogies between the regional groups of the Arpadian epoch male populations - according to some significant measurements of the neuro-and splanchnocranium. The summarized group from the final Medieval times has an intermediary position among the Arpadian period series originating from Transdanubia, Northern Hungary and the Danube-Tisza interfluvial as far as the main trait complexes are concerned. The craniological series of contemporary Hungarians reveal the maximum similarity to the late Medieval group. In the interval between these two epochal periods of the formation of the Central Danubian variant more important morphological characters had been inherited according to the correlations between orbital and nasal height as well as to that one between nasal breadth and bizygomatic diameter.

In the later phase (2nd millennium A. D.) of the formation of the variant mentioned the correlation between the components of the hypermorphic Proto-Europid and the hypomorphic Mediterranean races functioned as a determinative factor, too. The survival of narrow-faced gracile forms to our times seems to be connected not only to the significant contingent of the Late-Roman-Avar period aborigines but to the more recent infiltrations of elements of the same southern component which took place in the Arpad period and later, too.

Our material included a sufficiently numerous contingent from every subcontinent of Eurasia and

more recent infiltrations of elements of the same southern component which took place in the Arpad period and later, too.

Our material included a sufficiently numerous contingent from every subcontinent of Eurasia and from the earlier periods of human history. We found that the praeauricular-faciocerebral relation seems to be suitable for the differentiation of the two main craniological subdivisions i. e. the massive broad-faced and the gracile narrow-faced components of the Europoid race-stock. Thus the northern confine of the dispersion of hypomorphic peculiarities extends from the estuary of the river Rhine in the West to the Mountain Massive of the Tien-Shan in the East while a relative homogeneity of both sexes characterized the Neolithic and Paleometallic epoch. These correlative data also confirm the hypothesis that the Alpine-Carpathian zone was the area of the dispersion of morphological peculiarities of the Mediterranean race.

The phenomena of brachycephalisation and gracilization can be regarded as fundamental manifestations of the epochal changes. When applying this to the Central Danubian region an increase of the cranial index can be observed from the La Tene period till our times. The mean values of this index are higher for the females than for the males in every period. The process of brachycephalisation became most intensive in the late Medieval period. The transversal diameter of the neurocranium increased with 8.4 mm in the male series, whereas in the female one with 7.0 mm from the Neolithic till present. The identical values of the transversal diameter in the female group of the Conquering Hungarians on the one side and in the final Medieval male series on the other side express the genealogical lines according to this measurement. Orthrocrany and mesoprosopy appeared as characteristic patterns during the last two millennia. The process which led to the formation of an approximative equilibrium between the gracile narrow-faced and the massive broad-faced components, the main determinants in the origin of the Central Danubian variant, took place in this period. It deserves attention that the values of the bizygomatic diameter and that of upper-facial height reflect a strong prominence within the general epochal trend in the period of Conquering Hungarians. The rate of epochal changes of various craniological traits was determined by some environmental factors with natural character (climate, soil, nutrition) as well as by social ones (agriculture, settlement, infiltration) and it was manifested by the common or controversial effect in the Central Danubian region, too. The gradual increase of the population density starting in the Neolithic (despite epidemics and various natural catastrophes) proved to be an important factor promoting infiltrations among various groups. It contributed to the widening of marital connections, i. e. to the rearrangement of the morphological trait complexes as well as to the appearance of race-variants (with a short time diapason).

Some regional complexes which were delimited according to the cranial index and the bizygomatic diameter may be regarded as determinants in the formation of the Central Danubian variant. Thus the dolichocran, medium broad-faced complex evolved in Transdanubia whereas a subbrachycran, relatively broad-faced complex on the Danube-Tisza interfluvial in the Avar Period. The mesocran, medium broad-faced complex (Transdanubia) appeared in the Arpadian age as well as the dolichomesocran, relatively narrow-faced complex (Danube-Tisza interfluvial), a mesodolichocran, medium broad-faced (southern part of the Trans-Tisza Plain). The coordination of the cranial index and the bizygomatic breadth made the mutual race-genetical interactions among the mentioned parts of the Central Danubian region conspicuous from the beginnings of the Avar Epoch till the final period of the Arpadian age (700 years, approximately 27 generations).

The Conquering Hungarians and some groups of the central somatological complex (Kunság, Southern Palóc, Taktaköz) are very close to each other according to the cranial index as well as to the bizygomatic breadth in the topography applied. The other somatological groups are much closer to the Conquering Hungarians than to the series of the late Medieval and that of the recent populations. These analogies gave evidence of the decisive role of the anthropological composition of Conquering Hungarians in the race- and ethnogenesis of the living population in the Central Danube region.

It could be stated that in the morphological composition of the Conquering Hungarians the Andronovean type was determinative and it became a constituent in the formation of the Central Danubian variant, being present in the central somatological complex of living Hungarians on the basis of wide-ranging

comparisons. When comparing Conquering Hungarians to the contemporary Tashkent Sheichantaur cemetery's data, they seemed to be closer to the Pamiro-Ferganean complex, according to the upper height of their facial skeleton. Whereas on the basis of their upper facial index, nasal-spine angle and of the slope of forehead they are closer to the West-Asiatic type. They are closer to the Andronovean types according to bizygomatic diameter values as well as to those of orbital and cranial indices. The values of the zygomaxillary angle seem to be very close to each other with the male crania of the summarized group of Conquering Hungarians, Sauromats as well as Andronoveans of the Bronze Age of Kazakhstan.

The North-Caspian variant diagnosed by the author and classified by him as Pontic race differed in the massive broad-faced component of the Bronze Age Andronovean type and being associated with the elements of the southern Europoids, it was preserved in the Central Danubian region. The formation of the Central European race begun before than Halstatt period.

The transgressive similarity produced by somatological, odontological and dermatoglyphical data make it evident that the Central Danubian variant is a partial result of the general race-genetical process manifested in the final etap (2nd millennia A. D.) of the formation of the Central European race.

CHAPTER 5

SOME PROBLEMS OF THE RACE- AND ETHNOGENESIS OF HUNGARIANS

The craniological material of Conquering Hungarians reveal significant analogies with the series of the North-Caspian Sauromato-Sarmatians in almost all morphological traits. The massive broad-faced Proteuropoid (Andronovean) - probably substratum - component was approximatively similarly present in the composition of 10th century Hungarians and the Sauromato-Sarmatian of the North-Caspian region. The hypermorphic Andronovean complex that amalgamated the North-Caspian variant of the Pontic race was preserved in its main features from the Sauromato-Sarmatians till Conquering Hungarians (high value of bizygomatic breadth, mesobrachycranic, narrow orbits, well pronounced nose).

The comparative stability of the ancient Andronovean component is reflected by the insufficient variation interval of some craniological patterns. The summarized group of Sarmatian male crania seems to be quite homogeneous according to the bizygomatic and length diameters, the upper facial and orbital height and nasal breadth.

The massive broad-faced variant of the Pontic race was localized in the North-Caspian region till the dissolution of the Alan Confederation. After this period the variant was relocated to the East-Pre-Caucasus. The Medieval craniological series of the Central Danubian region seem to present a marked similarity to synchronous groups of the North-Caucasus according to the variation amplitudines of some metric traits, representing a common, hypermorph North-Caspian substratum from the Sauromato-Sarmatian Age in the Conquering Hungarians and in the Medieval ancestors of those of some peoples inhabiting North-Caucasus (Ossets, Ingush and others).

Taking into consideration the significant distance of the Central Danubian Basin Conquering Hungarians had a clear Europid physiognomy compared to all the finds of the Kama-Bielaya region and Western Siberia. Therefore we must not leave out of consideration the possibility of the various composition (Mongoloid and Europoid) of the Ugrian ethno-linguistic group. Paleoanthropological and archaeological data (K. F. Smirnov, K. V. Salnikov, M. G. Moskova) confirm the hypothesis about the infiltration of Protougors which started from the steppe and forest-steppe zones of the Trans-Ural region into the area of the North-Caspian Sauromats in the final phase of the Bronze Age. Some parts of the North-Caspian antique-era population may be identified with the Protohungarians who developed in the Early-Prochorovo phase of Sarmatians' history. The hypothetical Protohungarians of the Prochorovo (Early Sarmatian culture) became specificated from the Finno-Ugric tribes of the southern Cis-Ural region as well as from the Protougors of Western Siberia. The expressivity of the Europoid appearance of the Protohungarians

became stressed from the beginnings of the Early Iron Age under the effects of the ancient Iranian Sauramato-Sarmatian ethnic environment.

The ethnohistorical role of Illyrians, inhabiting the Central Danubian region in the Early Metallic period was outlined by archaeological and toponymic data. Morphological peculiarities infiltrated the Carpathian Basin with the movement of Celtic tribes from the West-Alp Belt that is from the hypothesized region of the formation of the Alpine race. Data originating with antic Roman epigraphics (L. Barkóczy, A. Mócsi) attest an Illyr-Celtic substrata which was present in the basic contingent of the population of antic Transdanubia in mutual contact with the East-Alpine regions (i. e. the areal of the Noric). The presence of words of French, Provençal, Italian and German origin in the Hungarian language (G. Bárczi) reflect the contacts which existed during the first half of the 2nd millennium A. D. No less important is the fact that the Conquering Hungarians assimilated ethnic elements not only from the Saltovo Mayatskoe culture but some of the East-Slavians, too (J. Perényo, I. Erdélyi, A. N. Moskalenko). The examination of craniological series originating with the Central Danubian historic population of the Arpadian age, indicated a multiple intermingling conditioned by different social and natural events (the invasion of Batu Khan's hordes in the 13th century - the Osman occupation of our country in the 16-17th centuries - epidemics in the 13-15th centuries).

Keeping in mind the anthropological composition of the living population of Hungary the regrouping of the population in the 18th century from western Transdanubia and from the zone of Palóc to the eastern Transdanubia and to the Danube-Tisza interfluvial, further to the southeastern parts of the Trans-Tisza Plain (L. Benkő) can be considered especially significant. In all these regrouping not only Hungarians but Germans, Croatians and Slovaks.

Considering the general ethnogenetic consolidation of the Hungarian people the controversion will be clearly manifested between the somatological and areal-linguistic data. Thus in the areal of the western dialect not only the north-western somatologic trait-complex of the Hungarian males can be detected but that one of the south-western complex, too. In the area of the central anthropological complex one can find the areas of the Tisza as well as that of the north-eastern and Palóc dialects, too (B. Kálmán). The boundaries of the four dialects of the Hungarian language do not coincide with ones of the three regional complexes diagnosed by the author on the basis of the somatological traits of Hungarian people.

EPILOGUE

Having investigated somatological, paleo- and neurocraniological materials of living and historical populations of Hungary and compared them with the anthropological data belonging to some regions of the Eurasic continent the following conclusions can be drawn.

1. According to the values of the somatoscopic index in the anthropological composition of the main ethnogeographical subdivisions of the Hungarian males the Mongoloid component seems to be present only in an insufficient quantity. On the whole taxonomic position of recent Hungarians is closely connected with the various components of the Europoid race-stock. All this is supported by the data obtained from ethnic odontology and dermatoglyphics.

2. On the contrary to former opinions the elements of the Mongoloid great-race wereas exceedingly insignificant in the composition of the historic populations of the 2nd millennium A. D. as in the composition of Conquering Hungarians as well as in that one of the Avar Khaganat, too. On the basis of a wide-ranging comparison of the data there is no doubt that different ethnic groups of Avars immigrated into the Central Danubian Basin in preponderant majority they bore characters of the Europoid great race. In addition it cannot be suppressed that in certain individual cases belonging to the Avar Khaganat, the Mongoloid type sometimes was present in such a clearly expressed form as among living Mongols and

among the Medieval Tuvins. Some elements of this Asiatic race-stock might have infiltrated into the Central Danubian Basin in the Late Sarmatian period, too.

The Central Danubian variant belonging to the Carpathian anthropological zone of the Central-European race is characterized by the dominance of dark hair and eyes of mixed color, medium developed beard, relatively weakly developed hair, insignificant percentage of right nasal bridge of the medial part of the upper eye-lid plica. The proportion of the light eye color significantly surpass that one of the dark iris. According to the metric traits the Central Danubian variant can be characterized by the complex of hyperbrachycephaly, mesoprosopy, leptrohyny and the medium tall body length. Within this variant can be three complexes can be characterized, the south-western, the north-western and the central anthropological complexes, none of which can be identified with a given type of Europoids. These regional complexes may be regarded as microareal groups of the Central Danubian variant.

4. In the anthropological composition of the living Hungarians the southern and northern components of the Europoid great-race have nearly the same proportion. This is confirmed first of all by the eye and hair pigmentation data as well as by the development of the medial part of the upper eye-lid plica. Thus the origin of the Central Danubian variant was connected to the massive as with the gracile forms. determinants of the North-Caspian (broad-faced) variant from Pontic race, having its consolidation in the whole period of the 2nd millennium A. D.

5. On the basis of a wide-ranging comparison of the European data analysis of the preauricular-faciocerebral relation promote the tracing of the gracilization process that means the establishment of the approximative frequencies of the hypomorphic (southern) and that one of the hypermorphic (northern) components of the Europoid race-stock on the territory of the Central Danubian region, too. The increasing immigration of the hypermorphic broad-faced component from the North-Caspian region into the Central Danubian region took place from the middle of the 1st millennium A. D. The final phase of this process was the settlement of ancient Hungarians in the 10th century in the Carpathian Basin. Facial breadth seems to be the most important differential-diagnostic pattern for the regional complexes in the case of the somatological as well as in that of paleoanthropological materials. On the basis of the samples studied from the living population of Hungary the compact distribution of broad-facedness can be stated in mosaic association with other patterns.

6. The heritability of the hypermorphic variant of the Europoid Pontic race can be traced in the North-Caspian region from the Neolithic till the chronological transition B. C. and A. D. that means after all the series from Sauromato-Sarmatians, too, revealing closer analogies with the Conquering Hungarians who are in the whole different considering their race-genetical character from the Medieval and antique tribes of the European Cis-Ural and West-Siberia. A summarized look over the paleoanthropological, archaeological and historical data will outline the earliest periods of the origin of the Protohungarians, namely the Presauromata (12th-7th century B. C.) and the Sauromato-Middle Sarmatian (6th-1st century B. C.) etap, in the diapason of which the process of the formation of the anthropological characters of far precursors of the Hungarian people took place. The area of this morphogenetical process extends from the North-West Caspian region to Mugodzhazh of the Srubno-Andronoveans who functioned as a hypermorphic variant substratum from the Pontic race. Any part of Europoid Srubno-Andronoveans may be identified with the Protougors.

7. The transgressive analogies between the regional complexes as regarding the somatological and the Medieval craniological data clearly attest that in the Central Danube region the main factor of race-genesis was the metisation, with the process of the brachycephalization, the reinforcing formation of the Central Danubian variant of the Carpathian anthropological zone of the Central-European race. Analogies mentioned are in accordance with the data of ethnic odontology and dermatoglyphics as with those of the Medieval historiographic and areal linguistic data of recent Hungarians.

8. There is no doubt that groups of different contingents from German, French, Italian, eastern, south-western Slavics have been assimilated into the ethnic composition of Hungarian people - at first of all in the 2nd millennium A. D. But in earlier periods of the ethnogenesis no less sufficient was the multiple

stratification of the emigrants from the Sarmato-Alan world (representatives of the massive and gracile variants of the Pontic race, armenoids and of Central Asiatic interfluvial race), the Illyrian-Thracian-Scythian-Celtic aborigines inhabiting the Carpathian Basin. During the whole of the 1st millennium in the Central Danubian region the proportion of the massive North-Caspian variant of the Pontic race was increasing so it seems to be quite realistic to suppose that at least one part of the inhabitants of the Avar Khaganat was of Sarmato-Alan origin.

9. The theory about the Cis-Uralian (Kama-Belaia) old homeland of the ancient Hungarians who settled down in the Central Danubian Basin in the 10th century could not be confirmed by anthropological data. Multilateral comparisons have shown that the forming processes of the anthropological physiognomy of the ethnoltribal compositions of ancient Hungarians took place in an area situated more to the South and chronologically more earlier in the far depth periods connected with the Sauromato-Sarmatian centuries.

Notes - The present English text of the author's doctoral thesis is the translation of the original work published in Russian, in Moscow, in 1977. On the 2nd of May, 1977 the subject-matter of the dissertation was reviewed by the author at a special meeting held in the Department of Anthropology of the Hungarian Natural History Museum. According to the decision passed by the National Postgraduate Degree Granting Board of the Hungarian Academy of Sciences dissertation was defended the 10th February, 1978 at a joint session of the Anthropological Research Institute of the Moscow State University and of the Anthropological Chair above-mentioned University; the dissertation has been accepted with an unanimous consent. Certain parts of the dissertation have been reviewed by the author on the 1st, 2nd and 3rd International Finno-Ugric Congresses (Budapest 1960, Helsinki 1965, Tallin 1970), on the 7th International Anthropological and Ethnological Congress (Moscow 1964), on the 1st and 2nd Hungarian Anthropological Symposia (Budapest 1959, 1967), on the International Conference on the History, Archeology and Culture of Central Asia in the Kushan period (Dushanbe 1968) and on the 9th Meeting of the Hungarian Biological Association (Budapest 1970).

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Medieval cemetery at Cegléd-Nyúlfehalom

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Ferencz, M.: Medieval cemetery at Cegléd-Nyúlfehalom. — *Anthrop. hung.* 1992, 22: 41-56.

Abstract — The author examined the osteological material of 70 individuals originating from 52 graves from the 11th-12th century cemetery of Cegléd-Nyúlfehalom. A general anthropological characterization of the series, secondary taxonomical analysis and comparison to other Árpáadian age series are given. With 10 tables, 6 figures.

In 1990, during the excavation of a Medieval church led by Edit Tari 52 graves came to light near Cegléd, at Nyúlfehalom. Owing to a special burial custom (some bones were often placed around into the graves) we could separate the bones of 70 individuals.

The anthropological material was examined in the Anthropological Department of the Hungarian Natural History Museum.

METHODS APPLIED

During the investigation the following methods were applied: the age at the time of death was determined on the basis of bone changes appearing on bones in life time and remaining visible on them (Farkas 1972). Martin & Saller (1957) age-group categories were applied. Sexes above 16 years were determined by the anatomical characteristics of the skulls and postcranial bones demonstrating sexual dimorphism (Éry, Kralovánszky & Nemeskéri 1963). The cranial measurements were taken by Martin's method (1928). The averages of dimensions and indices (M), the range of variations (V_{\min} - V_{\max}) and standard deviation (s) were also calculated. Classifying anthropometrical characteristics Debets's categories were applied (Alexeev & Debets 1964). Stature was determined partly by the method of Breiting (1938) and Bach (1965), and by using Pearson's method (1899). In analysing secondary taxonomical characteristics Lipták's (1969) taxonomical system was applied. Comparative examinations were carried out by the distance calculations of Penrose (1954) and by applying Alexeeva's (1966) special indices.

GENERAL CHARACTERIZATION

Among the examined 70 persons 15 (21.43%) had both skulls and postcranial bones. In 23 cases (32.86%) only skulls were available while 32 persons (45.71%) were represented only by postcranial bones (Tables 1, 2).

There are 27 (38.57%) males, 17 (24.29%) females and 26 (37.14%) undeterminable skeletons in this series.

ANTHROPOLOGICAL ANALYSIS

According to the mean-values, the brain-cases of the males are long, medium wide and medium high. By the indices they are dolichocranic (7 skulls are hyperdolichocranic), chamaecranic (5 skulls are hyperchamaecranic), metriocranic and metriometopic. Facial skeletons have the following characteristics: medium wide zygomatic arc, medium bizygomatic breadth. Faces are high (there were only 3 measurable skulls: 1 skull is very high, 2 are medium high), upper faces are medium high. Orbits are medium wide and medium high. Nasal apertures are medium wide and high. According to the calculated indices facial skeletons are leptoprosopic, mesen. Orbits are mesoconch, noses are leptorrhine, palates are mesostaphyline (Table 3).

The brain-cases of the females are very long (2 skulls are medium long, 2 are long and 2 are very long), medium wide and low (3 are low - very low but 1 skull is very high). By the indices they are dolichocranic (1 skull is hypercranic, the others are dolichocranic - hyperdolichocranic), chamaecranic. Two groups can be separated according to the breadth-height index: one group is hypertapeinocranic - tapeinocranic, an other group is acrocranic - hyperacrocranic. It is the same by the transversal-frontoparietal index: there is a stenometopic and an eurymetopic group. Facial skeletons are characterized by narrow zygomatic arcs with narrow bizygomatic breadth. In one case the face is very low, in other case it is medium high (there are only two measurable skulls). The upper faces are medium high. Orbits are narrow, low. Noses are narrow, medium high. Facial skeletons are hypereuryprosopic - leptoprosopic (the number of cases was 2), lepten (but 1 skull is hypereuryen). Orbits are mesoconch, noses are mesorrhine (there are opposed groups), palates are mesostaphyline (Table 3).

The individual measurements of males are summarized in Table 4, those of females in Table 5.

In evaluating morphological marks, the majority of the male skulls' circumferences is ovoid (42.9%) in norma verticalis, but I have found a significant number of byrsoid skulls (35.7%). Glabella is especially markedly developed. Degree 5 is the most frequent. Protuberantia occipitalis externa is weak in one group of skulls (degree 2) and expressively strong in the other group (degree 4). Processus mastoideus is markedly developed. Spina nasalis anterior is strongly developed. On the lower edge of apertura piriformis sulcus praenasalis can be observed at 80%. Fossa canina is shallow. Alveolar prognathy is moderate or expressed in the same ratio. At 75% of males there is no abrasion or it has just begun (Table 6).

Female skulls' circumference in norma verticalis is rhomboid at 50%. Glabella and arcus superciliaris are weakly developed, mostly belong to degrees 1 and 0. Processus mastoideus is very small. Spina nasalis anterior is visible only in some cases, these are medially developed. The lower edge of apertura piriformis was detectable on 3 skulls. Sulcus praenasalis can be observed in all cases. Half of the skulls presented very shallow fossae caninae while the other half of them displayed deep ones. Alveolar prognathy is moderate or expressed in equal rate. Abrasion of teeth is expressively slender (Table 6).

On the average stature of males is tall medium according to the method both of Pearson and Breiteringer (Table 3). Stature of females is medium by the process of Pearson and tall medium after Bach (Table 3). I was able to calculate the stature of 12 male and 3 female skeletons. Individual measurements of males and females are summed up in Table 7.

Anatomical variations and abnormalities are summarized in Table 8. In summing up it can be stated that in our cemetery the appearance of the examined 12 characteristics is average compared with other Árpádian age series. They are more frequent at males than at females (e. g. ossa Wormiana, sacrum bifidum) (Fig. 2).

We could recognize spondylosis deformans on the vertebrae of 10 individuals. It is 21.28% of the whole postcranial skeletons. There are 7 males, 2 females and 1 undeterminable sex among them. We observed arthrosis deformans on the tibia of the male of Grave No. 44a and on some of the long bones of the male of Grave No. 51 (Fig. 1).

TAXONOMICAL ANALYSIS

10 male and 4 female skulls were suitable for the secondary taxonomical examination.

The ratio of Nordoids is the greatest, 30% in the male group. The males of Grave Nos. 17/2 (Ad) and 41 (Ad) clearly carry Nordoid characteristics. The features are mixed with an undetermined group on the skull of Grave No. 12 (n-x). The stature of this individual is medium, which relates to the mixing of the types. Cromagnoids are represented by the skull of Grave No. 8 among the males. This skull is brachycephalic according to the cranial index, but the stature of this person is not known owing to the fragmentary postcranial bones. On the basis of his face this skull is CrB-x. The common feature of the males from Grave Nos. 34a (Ad) and 47a (Ad) is the low, wide-medium wide face with hyperdolichocranic skull. Unfortunately, none of their mandibles are intact, so their complete faces can only be imagined. I think that the characteristics of Lappids and those of a dolychocranic type - may be Nordoid - are mixed on these two faces. The features of the Lappid type can be seen on the male skull of Grave No. 24a (Mat), too. In this case a mesocranic brain-case is added to the low, wide face. The male skulls of Grave Nos. 17a (Mat) and 38a (Mat) are similar to each other. They have dolichocranic skulls with high and medium wide faces. The characteristics of Atlanto-Mediterranean type are mixed with those of another type with wider face (am-x). The male skull of Grave No. 51 (Mat) shows the features of Mediterranean type. His stature was higher than the common stature in the classical Mediterranean group (m-x).

In the female group Grave No. 35 (Juv) shows the characteristics of Gracile Mediterranean type (m), but opposite to the common dolichocranic skull hers is expressively hyperdolichocranic. The brachyranic female skull of Grave No. 36a (Ad) belongs to the Alpien group. The characteristics are combined with other features (a-x). The female skull of Grave No. 38b (Juv) carries the Nordoid features mixed with others (n-x). Her skull was hyperdolichocranic. The dolichocranic female skull of Grave No. 52 (Ad) is a typical CrA one.

COMPARATIVE ANALYSIS

I have drawn 6 Árpádian age cemeteries into the comparative analysis. They were taken from the 10th to the 12th centuries. The selection of the series was dictated by their geographic locations and their archaeological ages.

The results of examinations by the Penrose' method

The "generalized Penrose distance" (D_p^2) - produced by the joint calculation of 12 measurements - gives the individual distances of each series from our cemetery (Penrose 1954) (Table 9).

The males of Kardoskút-Fehértó come closest to the males of Cegléd-Nyúlfülehalom. The value of D_p^2 is 2.59, being the smallest. The distance of Orosháza-Rákóczi-telep is somewhat larger, but it is relatively similar (4.27). The largest distance is presented by the males of Kiskunfélegyháza-Alpári út (13.24).

In comparing the female series the Orosháza-Rákóczi-telep is the closest to our cemetery (2.32). The females of Cegléd show a relative similarity (4.22). The females of Békés-Povádzug are the farthest from the males of Cegléd-Nyúlfülehalom (10.44).

The special indices of Alexeeva

Our results are given in the Table 10.

The males of Nagykovács and Kardoskút-Fehértó show some similarity to the males of Cegléd-Nyúlfülehalom on the basis of the correlation of skull height-breadth-length and of upper face-skull height (Fig. 3). The females of Cegléd and Orosháza are the closest to our females, but it is only a relative similarity, it is not expressed (Fig. 5).

On the basis of correlations of cranial height-orbital height and of nasal breadth-facial breadth the male series Kardoskút-Fehértó show the greatest similarity (Fig. 4). The females of Cegléd and Nagykovács are the closest to the series of Cegléd-Nyúlfülehalom and Orosháza is not far, either (Fig. 6).

We can state that the male series of Kardoskút-Fehértó (11th-12th c.) and the female series of Cegléd (11th-12th c.) are the most similar to our cemetery. The farthest series are Kiskunfélegyháza-Alpári út (males) and Békés-Povádzug (females).

SUMMARY

When summarizing the results of the two comparative examinations we reach the same conclusions. The male group of our cemetery presents the most marked similarity with the male series of Kardoskút-Fehértó. At the females the situation is a little bit more complicated. On the basis of the Penrose method the females of Orosháza-Rákóczi-telep is the most similar to the females of Cegléd-Nyúlfülehalom and the females of Cegléd is on the second place. By Alexeeva's special indices the females of Cegléd are the closest to our female group and the females of Orosháza are only on the second place, and even according to Fig. 6 they are only on the third place. However, we can declare that the results of the two comparative methods confirm each other. On the other hand, the male series of Kardoskút-Fehértó and the female series of Békés-Povádzug are the most different from our cemetery.

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Table 1 Distribution of sex, age and preservation

Types of material	Age groups	Male	Female	Undet. sex	Total	%
Cranium and postcranium	Infans I	-	-	6	6	8.57
	Infans II	-	-	-	-	-
	Juv.	-	-	1	1	1.43
	Ad.	4	1	-	5	7.14
	Mat.	3	-	-	3	4.29
	Total	7	1	7	15	21.43
Cranium only	Infans I	-	-	2	2	2.86
	Infans II	-	-	3	3	4.29
	Juv.	-	2	-	2	2.86
	Ad.	6	5	-	11	15.71
	Mat.	4	-	-	4	5.71
	Undet.	-	-	1	1	1.43
	Total	10	7	6	23	32.86
Postcranial skeletons	Infans I	-	-	4	4	5.71
	Infans II	-	-	3	3	4.29
	Juv.	-	-	2	2	2.86
	Ad.	3	3	-	6	8.57
	Mat.	3	1	-	4	5.71
	Undet.	4	5	4	13	18.57
	Total	10	9	13	32	45.71
Total		27	17	26	70	
%		38.57	24.29	37.14		

Table 2 Distribution of crania

Age groups	Measurable		Unmeasurable			N	Total %
	Male	Female	Male	Female	Undet.		
Infans I	-	-	-	-	8	8	21.05
Infans II	-	-	-	-	3	3	7.89
Juvenis	-	2	-	-	1	3	7.89
Adultus	7	4	3	2	-	16	42.11
Maturus	7	-	-	-	-	7	18.42
Undet.	-	-	-	-	1	1	2.63
Total	14 (36.85%)	6 (15.79%)	3 (7.89%)	2 (5.26%)	13 (34.21%)	38	

Table 3 Parameters of male and female series

Martin No	Males				Females			
	N	V	M	s	N	V	M	s
1	13	179-199	187.62	5.80	6	173-191	183.00	6.54
1c	13	178-195	184.46	4.70	6	174-189	181.67	7.12
5	10	93-109	101.30	4.83	5	88-102	97.00	5.74
8	13	135-149	139.54	4.52	6	132-143	137.00	4.82
9	12	87-111	98.83	6.06	6	86-100	93.17	5.64
17	11	125-141	131.73	4.70	6	120-138	125.50	7.21
40	9	88-108	98.00	7.33	3	83-93	89.33	5.51
43	9	102-114	107.22	4.49	4	94-99	96.60	2.10
45	9	128-143	134.78	5.29	4	117-120	119.50	1.94
46	10	87-104	96.00	4.92	4	83-90	87.00	2.94
47	3	115-138	123.33	12.74	2	94-113	103.50	13.44
48	11	64-80	70.73	4.97	4	57-73	65.25	6.65
50	11	19-24	21.64	1.87	4	19-19	19.00	0.00
51	11	37-44	41.09	1.81	4	38-41	39.25	1.51
51a	11	35-42	39.55	2.07	4	36-39	37.25	0.97
52	11	30-36	34.45	1.64	4	29-35	32.75	2.91
54	11	23-30	25.45	2.02	4	21-26	23.00	2.16
55	11	47-63	54.18	4.88	4	42-55	49.00	5.48
62	12	35-53	46.50	4.82	4	41-45	43.50	1.76
63	12	34-47	40.08	3.94	4	35-38	36.75	1.33
65	4	118-130	123.50	5.52	3	100-118	110.00	9.17
66	6	89-110	101.67	8.29	3	93-98	95.67	2.56
69	8	25-39	29.50	4.63	3	21-28	24.33	3.52
70	6	58-70	63.67	4.24	3	53-59	55.33	3.22
71a	8	27-39	32.25	3.62	3	29-34	32.00	2.65
8: 1	13	68.2-80.1	74.85	7.29	6	71.2-82.7	75.83	8.41
17: 1	11	64.1-76.2	70.00	6.50	6	63.4-75.1	69.67	8.92
17: 8	11	83.9-104.4	95.32	10.47	6	83.9-103.0	92.17	14.63
9: 8	12	56.8-78.7	69.58	11.43	6	64.2-72.7	68.00	7.51
47:45	3	83.3-107.8	92.50	26.96	2	79.0-96.6	88.50	24.75
48:45	9	48.9-62.5	52.89	8.11	4	47.9-60.8	55.00	11.17
52:51	11	75.0-91.9	84.00	8.87	4	76.3-87.5	83.75	9.61
54:55	11	41.9-50.9	47.18	5.76	4	38.2-61.9	48.00	20.29
63:62	10	69.4-108.6	88.40	23.79	4	79.6-90.24	84.50	9.35
Stat.(Pearson)	12	158.5-177.7	167.00	10.57	3	150.8-157.2	154.67	6.13
Stat.(Bach)	12	162.0-176.9	169.92	8.57	3	155.3-160.0	156.83	5.78

Table 4 Individual measurements and indices of males

Martin No	Grave No Age	2 Mat	8 Mat	12 Ad	16 Ad	17/1 Mat	17/2 Ad	24a Mat
1		187	186	199	-	182	186	179
1c		186	180	191	-	185	182	178
5		-	109	105	-	97	-	93
8		136	149	139	-	139	148	140
9		93	101	97	-	105	101	87
17		128	125	133	-	132	-	128
40		-	108	102	-	92	-	88
43		-	114	102	-	111	106	-
45		-	143	128	-	136	-	131
46		-	93	97	-	91	96	97
47		-	-	138	-	117	-	-
48		-	71	80	-	69	76	64
50		-	23	23	-	23	24	19
51		-	44	41	-	41	42	37
51a		-	43	40	-	40	42	35
52		-	35	34	-	35	35	34
54		-	24	26	-	26	26	23
55		-	55	62	-	52	57	47
62		47	53	49	44	35	48	41
63		-	46	34	47	38	40	37
65		-	-	118	-	120	-	-
66		89	-	110	101	95	-	-
69		26	-	39	26	25	29	-
70		62	-	66	61	58	-	-
71a		27	-	32	29	32	35	-
8:1		72.7	80.1	69.9	-	76.4	79.6	78.2
17:1		68.5	67.2	66.8	-	72.5	-	71.5
17:8		94.1	83.9	95.7	-	95.0	-	91.4
9:8		68.4	67.8	69.8	-	56.8	68.2	62.1
47:45		-	-	107.8	-	86.0	-	-
48:45		-	49.7	62.5	-	50.7	-	48.9
52:51		-	79.6	82.9	-	85.4	83.3	91.9
54:55		-	43.6	41.9	-	50.0	45.6	48.9
63:62		-	86.8	69.4	106.8	108.6	83.3	90.2

Table 4 (continued)

Martin No	Grave No Age	34a Ad	38a Mat	41 Ad	44 Mat	47a Ad	51 Mat	x Ad
1		190	190	185	198	189	186	182
1c		184	187	183	195	185	183	179
5		104	106	100	101	97	101	-
8		135	141	135	135	138	141	138
9		97	111	100	100	94	100	-
17		136	134	141	127	135	130	-
40		101	106	93	-	90	102	-
43		104	113	106	-	102	107	-
45		133	142	131	-	131	138	-
46		96	104	97	-	87	102	-
47		-	-	-	-	-	115	-
48		68	77	68	-	68	71	66
50		21	21	24	-	10	21	20
51		40	42	40	-	43	41	41
51a		39	40	38	-	40	39	39
52		34	36	30	-	35	36	35
54		26	30	25	-	24	27	23
55		52	63	54	-	50	53	51
62		48	52	46	48	-	47	-
63		39	45	40	37	39	-	39
65		-	-	-	130	-	126	-
66		-	-	108	-	-	107	-
69		-	-	30	33	-	28	-
70		-	-	-	70	-	65	-
71a		-	-	32	32	-	39	-
8:1		71.1	74.2	73.0	68.2	73.0	75.8	75.8
17:1		71.6	70.5	76.2	64.1	71.4	69.9	-
17:8		100.7	95.0	104.4	94.1	97.8	92.2	-
9:8		71.9	78.7	74.1	74.1	68.1	70.9	-
47:45		-	-	-	-	-	83.3	-
48:45		51.1	54.2	51.9	-	51.9	51.5	-
52:51		85.0	85.7	75.0	-	81.4	87.8	85.4
54:55		50.0	47.6	46.3	-	48.0	50.9	45.1
63:62		81.3	86.5	87.0	77.1	-	-	-

Table 5 Individual measurements and indices of females

Martin Nº	Grave Nº	1 Ad	35 Juv	36a Ad	38a Ad	38b Juv	52 Ad
1		173	187	173	186	191	178
1c		174	188	174	187	189	178
5		97	102	88	-	102	96
8		132	134	143	143	136	134
9		96	86	93	100	97	87
17		130	138	120	124	121	120
40		-	92	83	-	-	93
43		-	94	97	-	99	96
45		-	117	120	-	120	119
46		-	83	90	-	88	87
47		-	113	-	-	-	94
48		-	67	64	-	73	57
50		-	19	19	-	19	19
51		-	40	38	-	41	38
51a		-	39	36	-	38	37
52		-	35	32	-	35	29
54		-	23	22	-	21	26
55		-	51	48	-	55	42
62		-	44	41	-	45	44
63		-	35	37	-	37	38
65		118	112	-	-	-	100
66		98	93	-	-	-	96
69		24	28	-	-	-	21
70		54	59	-	-	-	53
71a		29	34	-	-	-	33
8:1		76.3	71.7	82.7	76.9	71.2	75.3
17:1		75.1	73.8	69.4	66.7	63.4	67.4
17:8		98.5	103.0	83.9	86.7	89.0	89.6
9:8		72.7	64.2	65.0	69.9	71.3	64.9
47:45		-	96.6	-	-	-	79.0
48:45		-	57.3	53.3	-	60.8	47.9
52:51		-	87.5	84.2	-	85.4	76.3
54:55		-	45.1	45.8	-	38.2	61.9
63:62		-	79.6	90.2	-	82.2	86.4

Table 6 Distribution of morphological characteristics

Characteristics		Male		Female		Total	
		N	%	N	%	N	%
Norma vertic.	Pent.	2	14.3	2	33.3	4	20.0
	Ovoid	6	42.9	-	-	6	30.00
	Rhomb.	-	-	3	50.0	3	15.0
	Birs.	5	35.7	1	16.7	6	30.0
	Sphen.	1	7.1	-	-	1	5.0
	Total:	14		6		20	
Glabella	Broca 1	-	-	1	16.7	1	5.0
	Broca 2	-	-	4	66.6	4	20.0
	Broca 3	-	-	1	16.7	1	5.0
	Broca 4	4	28.6	-	-	4	20.0
	Broca 5	8	57.1	-	-	8	40.0
	Broca 6	2	14.3	-	-	2	10.0
		Total:	14		6		20
Prot. occ. externa	Broca 0	-	-	2	33.3	2	10.5
	Broca 1	1	7.7	4	66.7	5	26.3
	Broca 2	6	46.1	-	-	6	31.6
	Broca 3	2	15.4	-	-	2	10.5
	Broca 4	4	30.8	-	-	4	21.1
	Total:	13		6		19	
Proc. mastoid.	Broca 1	3	21.4	5	83.3	8	40.0
	Broca 2	5	35.7	1	16.7	6	30.0
	Broca 3	6	42.9	-	-	6	30.8
		Total:		14		6	20
Spina nasalis anterior	Broca 1	-	-	-	-	-	-
	Broca 2	-	-	1	50.0	1	50.0
	Broca 3	3	27.3	1	50.0	4	30.8
	Broca 4	8	72.7	-	-	8	61.5
		Total:		11		2	13
Apertura pirif.	Fossa	2	20.0	-	-	2	15.4
	Sulcus	8	80.0	3	100.0	11	84.6
		Total:	10		3		13
Fossa canina	(1)	4	33.3	2	50.0	6	37.5
	(2)	6	50.0	-	-	6	37.5
	(3)	2	16.7	1	25.0	3	18.8
	(4)	-	-	1	25.0	1	6.2
	(5)	-	-	-	-	-	-
	Total:	12		4		16	
Alveolar prognathy	Vertical	2	16.6	-	-	2	12.5
	Moderate	5	41.7	2	50.0	7	43.7
	Expressed	5	41.7	2	50.0	7	43.7
		Total:	12		4		16
Abrasio	Körber 1	2	16.7	2	40.0	4	23.5
	Körber 2	7	58.3	3	60.0	10	58.8
	Körber 3	1	8.3	-	-	1	5.9
	Körber 4	2	16.7	-	-	2	11.8
		Total:	12		5		17

Table 7 Individual parameters of stature

Grave N ^o	Sex	Age	Pearson	Breitinger/Bach
2	Male	Mat	158.5	162.0
9	Male	Ad	177.7	176.9
12	Male	Ad	161.8	166.3
17/2	Male	Ad	168.8	171.9
19	Male	Ad	167.6	171.7
31	Male	Ad	165.6	166.1
34a	Male	Ad	161.0	166.3
35	Male	Mat	171.7	175.4
38	Male	Ad	165.4	168.9
44	Male	Ad	164.6	167.6
48	Male	Ad	168.3	167.9
51	Male	Mat	170.5	171.6
6	Female	Ad	155.0	160.0
24	Female	Ad	157.2	155.7
36	Female	Mat	150.8	155.3

Table 8 Anatomical variations and abnormalities

Variations		Male	Female	Total
Sutura metopica		1	-	1
Os apicis		-	1	1
	Left	1	2	3
Ossa Wormiana	Right	-	-	-
in sut. lambdoidea	Both sides	6	2	8
	Total	7	4	11
		(63.6)	(36.4)	
Ossa Wormiana	Left	1	-	1
in sut. sagitt.				
Ossa Wormiana at	Left	-	1	1
incisura pariet.	Right	1	-	1
	Both sides	1	-	1
	Total	2	1	3
			(66.7)	(33.3)
Os epiptericum	Both sides	-	1	1
Os incaie		-	1	1
Bathrocephalia		2	2	4
			(50.0)	(50.0)
Pin teeth	Both sides	1	-	1
	Caudalis	4	1	5
Sacrum bifidum	Cranialis	-	-	-
	Both sides	-	1	1
	Whole	1	-	1
	Total	5	2	7
			(71.4)	(28.6)
Sacralisation		2	-	2
Perf fossae	Left	1	1	2
olecrani humeri		(50.0)	(50.0)	

Table 9 Size, shape and generalized Penrose distance of different male and female series from Cegléd-Nyúlfülehalom

Series	Males			Females		
	C _Q ²	C _Z ²	D _p ²	C _Q ²	C _Z ²	D _p ²
1. Békés-Povádzug	0.13	0.28	4.82	0.20	0.62	10.44
2. Cegléd	0.06	0.29	4.75	0.02	0.27	4.22
3. Kardoskút-Fehértó	0.22	0.12	2.59	0.04	0.44	7.00
4. Kiskunfélegyháza						
-Alpári út	0.42	0.76	13.24	0.01	0.55	8.67
5. Nagykőrös	0.0002	0.33	5.11	0.41	0.35	6.86
6. Orosháza-Rákóczi telep	0.10	0.25	4.27	0.03	0.26	2.32

Table 10 Some comparative indices of the neuro- and splanchnocranium
- Males and females -

Series	N	Males				Females				
		1	2	3	4	N	1	2	3	4
1. Békés-Povádzug	27	84.8	53.3	24.7	19.5	35	83.7	51.4	25.1	20.4
2. Cegléd	18	83.4	53.3	24.5	18.9	19	80.6	53.5	26.4	19.3
3. Kardoskút-Fehértó	109	81.7	53.3	25.6	18.4	84	82.3	52.6	25.1	18.8
4. Kiskunfélegyháza										
Alpári út	12	84.6	50.0	22.5	18.5	17	81.5	50.2	24.8	18.5
5. Nagykőrös	23	81.5	54.3	25.0	19.3	14	83.7	51.3	25.7	19.6
6. Orosháza-Rákóczi telep	87	82.8	53.9	25.0	19.0	75	81.1	52.6	25.3	19.1
7. Cegléd-Nyúlfülehalom	13	80.5	53.7	26.2	18.9	6	78.4	52.0	26.1	19.2

$$1 = \frac{17 \times 100}{(1+8) \cdot 2} \quad 2 = \frac{48 \times 100}{17} \quad 3 = \frac{52 \times 100}{17} \quad 4 = \frac{54 \times 100}{45}$$

Sequence of series of Tables 9-10 is as follows:

1. Békés-Povádzug, 10th-12th c. (Lipták & Farkas 1967)
2. Cegléd, 11th-12th c. (Lipták 1957)
3. Kardoskút-Fehértó, 11th-12th c. (Marcsik 1970)
4. Kiskunfélegyháza-Alpári út, 11th-13th c. (Lipták 1954)
5. Nagykőrös, 11th-13th c. (Pap 1979)
6. Orosháza-Rákóczi telep, 10th-12th c. (Lipták & Farkas 1962)
7. Cegléd-Nyúlfülehalom, 11th-12th c.

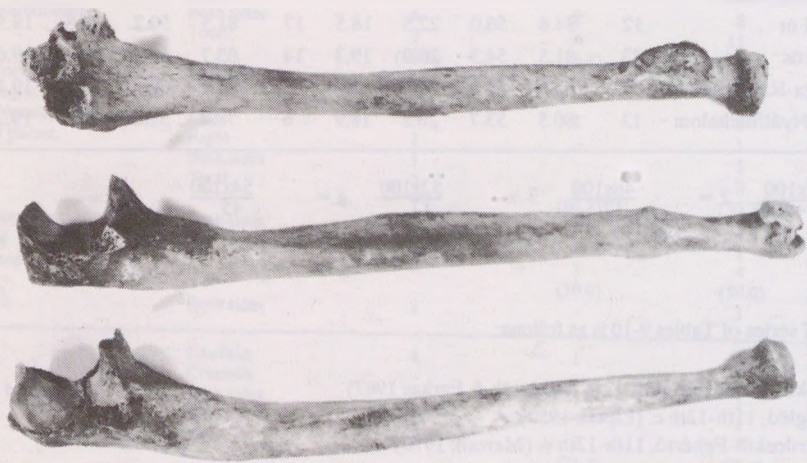
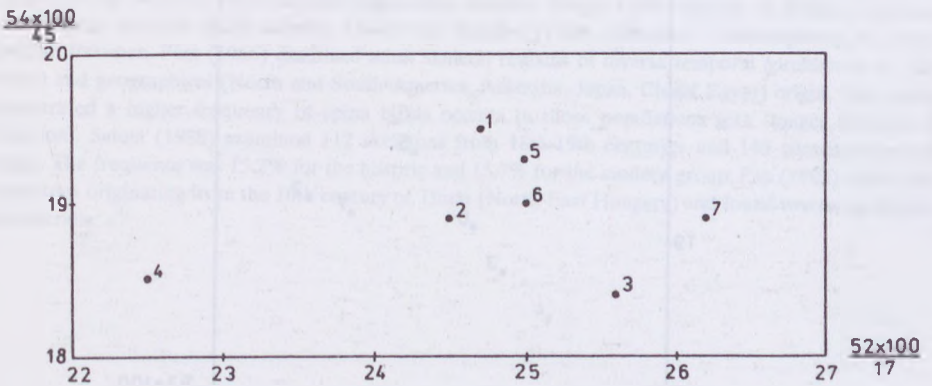
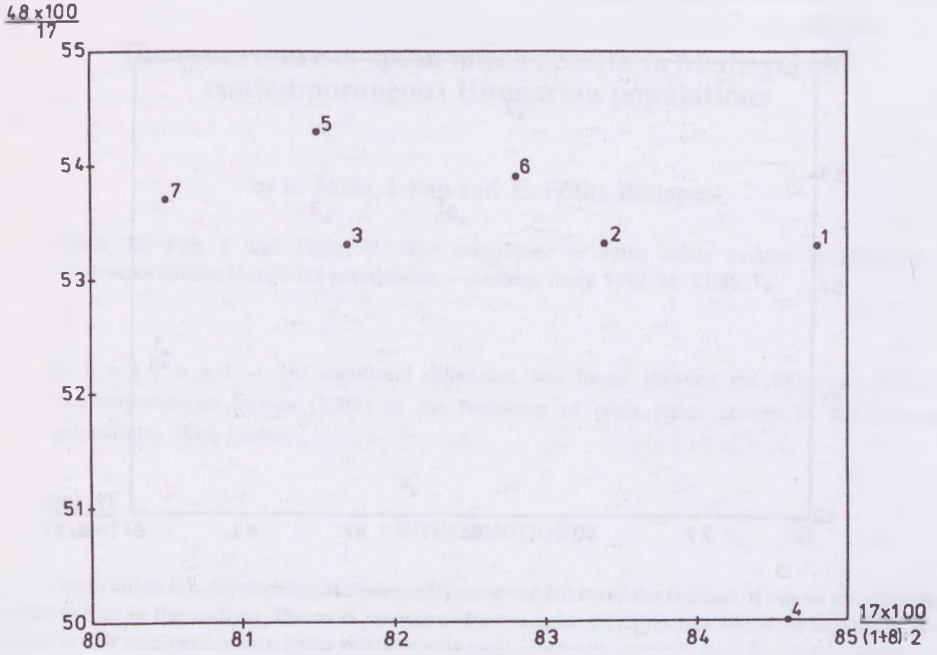


Fig. 1 Cegléd-Nyúlfehalom, Grave No. 42, Male, Maturus

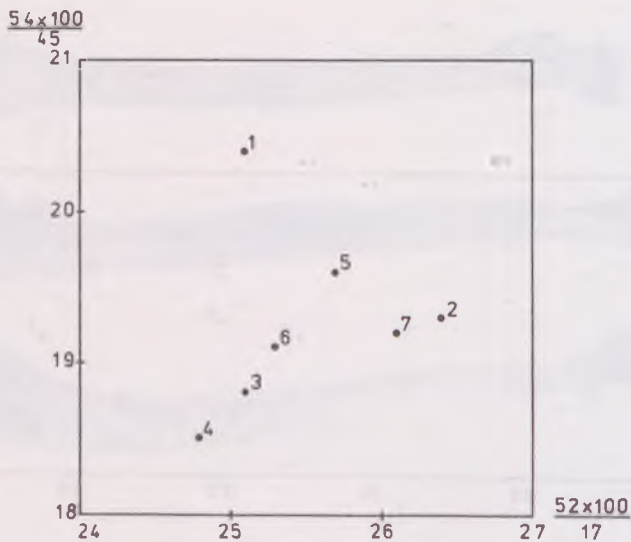
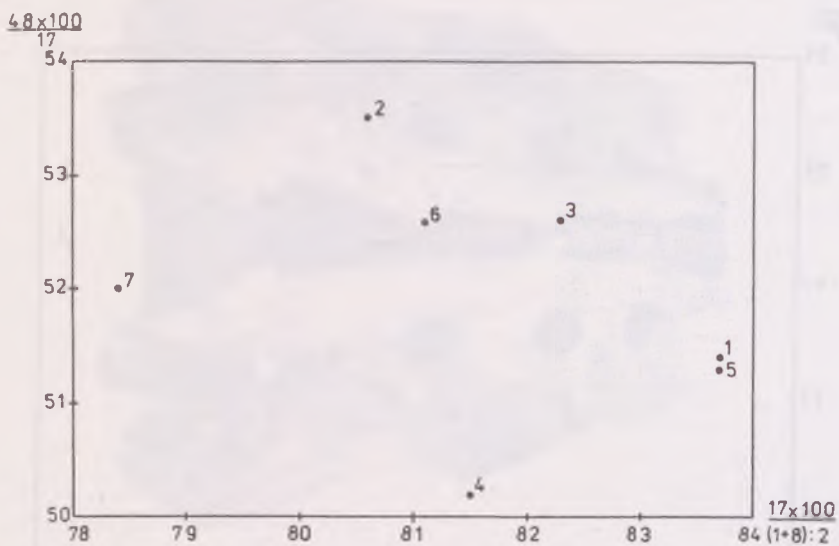


Fig. 2 Cegléd-Nyúlfehalom, Grave No. 51, Male, Maturus

Figs. 3-4 Comparison of male series. Sequences of series are the same as in Table 10



Figs. 5-6 Comparison of female series. Sequences of series are the same as in Table 10



The occurrence of spina bifida occulta in Medieval and contemporaneous Hungarian populations

by L. Józsa, I. Pap and E. Fóthi, Budapest

Józsa, L., Pap, I. and Fóthi, E.: The occurrence of spina bifida occulta in Medieval and contemporaneous Hungarian populations. — *Anthrop. hung.* 1992, 22: 57-60.

A b s t r a c t — No significant difference was found between the historical (4.2%) and contemporaneous groups (2.3%) in the frequency of spina bifida occulta in the Hungarian populations. With 1 table.

INTRODUCTION

Spina bifida is a developmental abnormality involving failure of the laminae of one or more vertebral arches to fuse in the midline. The most innocuous form is spina bifida occulta where no herniation of the spinal cord or meninges occurs. Spina bifida occulta most commonly occurs in the fifth lumbar and/or upper or two sacral vertebrae. The incidence of severe spina bifida with meningocele or with meningomyelocele is well documented, but the data concerning the frequency of spina bifida occulta are confusing. Spina bifida occulta is usually symptomless and therefore often passes undetected. More information is required concerning the prevalence of spina bifida occulta in archaeological material. Thould and Thould (1983) found 51% spina bifida occulta among 680 skeleton from Roman Britain. Braunstein et al. (1988) in one of 12 royal mummies have found sacralisation of L₅, but no spina bifida occulta. Luzsa et al. (1988) in five of 15 Árpáadian age skeleton demonstrated spina bifida sacralis. Simper (1986) among 46 Eskimo skeletons found 5 cases of spina bifida sacralis. Lester and Shapiro (1968) calculated 15% frequency on North American Eskimos. Post (1966) examined adult skeletal remains of diverse temporal (prehistoric to 12th century) and geographical (North and South America, Australia, Japan, China, Egypt) origin. The author demonstrated a higher frequency of spina bifida occulta in those populations with "longer histories of civilization". Saluja (1988) examined 112 skeletons from 18th-19th centuries and 140 contemporaneous persons. The frequency was 15.2% for the historic and 15.7% for the modern group, Pap (1983) elaborated 46 skeletons originating from the 10th century of Tímár (North-East Hungary) and found two cases of spina bifida sacralis.

MATERIAL AND METHOD

Two populations deriving from Hungary were examined. One represented a historical population and the other comprised an extant group.

A. Historical material: Consisted of 283 skeletons 50 children and juveniles with undetermined sex, and 233 adults (113 male and 120 female). The remains were excavated in Karos-Eperjesszög (10th c.), Tiszafüred (11th c.), Budapest-Timur street (11th c.), Rakacaszend (12th-17th c.), Szakony (11th c.), Tímár I. and II. (10th c.).

Most are in excellent state of preservation and are stored now in the Anthropological Department of the Hungarian Natural History Museum, Budapest.

The age and sex of each individual were recorded where possible. The vertebral column was reconstructed for demonstration of scoliosis, kyphosis, etc. Each vertebra and sacrum was examined macroscopically and under Zeiss-Bioplast stereomicroscope, as well as by X-ray with Medicor GT X-ray apparatus.

B. Contemporaneous material was represented by a series of anteroposterior radiographs of adults (300 persons) showing the lumbosacral region. The radiographs comprises films taken following trauma. These films were stored in the X-ray films archive of the National Institute of Traumatology, Budapest.

RESULTS

The incidence of spina bifida occulta in Medieval groups was 4.2%. No instance was seen in the L₁₋₅ sequence. Spina bifida occulta of S₁₋₅ was the most common form (4 cases), non closure of S_{3,5} was found in 2 cases, of S_{4,5} in 4 cases and of S_{2,3} in one case, and S₁ also in one case (Table 1).

Lumbalisation of S₁ segment was found in 2 cases and the S_{1,2} segments also in 2 cases. Sacralisation of L₅ vertebra occurred in 4 cases (Table 1).

The incidence of lumbalisation was 1.4% as well as the sacralisation (1.4%) of the L₅ vertebra. The malformation of the spine was found exclusively in the adults. Combination of spina bifida and lumbalisation or sacralisation was seen in 4 cases. No other major malformation of spine was noted.

In the contemporaneous material 7 (4 males and 3 females) cases of spina bifida (2.3%) occulta was found.

Table 1 Incidence of spina bifida occulta in Hungarian populations of the 10th-16th centuries

	Male	Female	Infants	Total
Spina bifida	113	120	50	283
	8	4	0	12
	(7.1%)	(3.3%)	-	(4.2%)
Lumbalis	4	0	0	4
				(1.4%)
Sacralis	3	1	0	4
				(1.4%)

DISCUSSION

We describe the occurrence of spina bifida in two Hungarian populations: one from the 10th-17th centuries and the other of the present day. In our material the incidence of spina bifida occulta was significantly lower than in the other materials. Thould and Thould (1983) reported 51%, Saluja (1988) 15.2%, Simper (1986) 11%, Ferembach (1963) 27% frequency of spina bifida occulta. The distribution on non-closure of various segments was also different from other historical and contemporaneous material (Saluja 1986, Ferembach 1963). In our material the non-closure of total dorsum of the sacrum was found in one-third of the cases and spina bifida of the S₁ segment was the rarest. The incidence of spina bifida occulta in males was twice higher than in females. Both lumbalisation of the S₁ segment and the sacralisation of L₅ vertebra were more frequent among males than females.

Spina bifida occulta, lumbalisation and sacralisation could cause a low backache (Hollinshead 1964). The origin of spina bifida is generally regarded as being multifactorial, involving genetic predisposition and environmental triggering factors (Saluja 1988). In our study no significant difference was found between the historical and contemporaneous groups in the frequency of spina bifida occulta in the Hungarian population (4.2% versus 2.3%). However, it does indicate that the product of interaction between the operative genetic and environmental factors has remained constant over the past centuries in Hungary.

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Severe cervical spina bifida in 16-18th century fossil material

by G. Tóth and B. Buda, Szombathely

Tóth, G. and Buda, B.: Severe cervical spina bifida in 16-18th century fossil material. — *Anthrop. hung.* 1992, 22: 61-66.

Abstract — The authors examined the closure deficiency of the vertebra of a fragmentary male skeleton from a 16-18th century cemetery, Hungary, Transdanubia. The serious grade lesion affected the cervical section (vert. c. I-VI). With 4 figures.

INTRODUCTION

Dysmorphology — one of the branches of paleopathology — deals with morphological and clinical manifestations of congenital developmental anomalies. These dysmorph features fall outside the field of variations considered normal.

The most frequently seen congenital malformations are the closure anomalies of the neural tube. During the fetal development, disorders can affect the process of the formation of the neural tube. It fails to close, and the forms developing from it remain open.

Main groups of closure disorders (Barta 1983, Csécséy et al. 1982, Czeizel 1976, Czeizel et al. 1973, Juhász 1982, Mumenthaler 1989, Papp 1986):

- anencephalia, exencephalia (complete or partial deficiency of the cerebrum or the neurocranium, or their developmental anomalies),
- spina bifida (closure deficiency of the vertebra in the mesial line, cleft spine),
- encephalocele (protrusion of the cerebral substance from the imperfectly closed cranium).

The first two forms make up 95% of the neural tube closure anomalies (Éry 1974, Papp 1986).

MATERIAL AND METHOD

The sand-pit of Gencsapáti-Felső (Hungary, Vas County, 5 kilometres from Szombathely) is known as a Pleistocene age site (Horváth 1958, 1965). In the 16-18th centuries A.D., the area was used as a cemetery. No significant archeological findings have been unearthed (Gábor Kiss archaeologist's personal

communication). On April, 1988, during a survey of the spot, the remains of a grave demolished by the mining activity appeared in situ in the sand wall from about 150 centimetres below the surface. After being unearthed, the broken, shrunk cranium viscerale cerebrale, and a significant part of the adjoining vertebrae cervicales (vert. c. I-VI), as well as the os hyoideum were transported together. The relatively high number of sporadic finds, and the amount of sand having been already removed with the bones in it did not allow the identification of other bones belonging to the grave.

Vertebra was examined macroscopically and by X-ray with Medicor GT-2 X-ray apparatus.

RESULTS AND DISCUSSION

Post-mortem fractures, suturolytic fractures were found on the cranium cerebrale. The composing bones are fragmentary, strongly warped. No warping in the facial region, but post-mortem fracture in the maxilla were detected.

The posterior arc sections and processi of the vertebrae cervicales (I-VI) are anatomically missing. Joint surfaces testify to a forced position of the 1st, 2nd and the 3rd vertebrae (Fig. 1). The deformation of the joining surfaces of the dens axis and atlas show the wear of cartilage and the turning of the bones on each other. X-ray photo shows sclerosis in the lateral sections of the vertebrae (Fig. 2). Minor post-mortem fractures of the vertebrae, on the endings of arc-sections decerepitating post-mortem lesions were found.

Os hyoideum is intact. Examenable features for sexing tend to be masculine. The synchondrosis sphenoccipitalis is ossified. On the basis of examinable sutures and denture the age is estimated about 25.

Accompanying pathological alterations:

Number of the teeth examined: 29

Missing ante-mortem: 1

Missing post-mortem: 2

Caries: 2

Alveolar atrophy.

Porotic hyperostosis of the orbit stad. I.1

Occult spina bifida means that no form protrudes through the bone defect, and the area is covered by regular structure skin tissue. Spina bifida cystica means that the lesion protrudes and results in a sack-like formation (Lorber & Salfield 1981). When the protruding formations are not covered by skin (or membrane) the rachischisis is called open.

According to most authors, the rate of incidence of spina bifida (rachischisis) among people is between 22-24% (Gömör & Bálint 1989). The anomaly, in 85% of the cases, affects the lumbo-sacral sections of the spine (Horányi 1961), caused by the fact that during the intrauterine development the closure of the spinal cord and spinal canal proceeds downwards.

Cleft cervical vertebrae are found in about 10% of the cases. Narrow clefts in the arc affecting one or two vertebrae are found in the finds of almost every cemetery (Farkas, Marcsik & Vékony 1976, Kőhegyi & Marcsik 1976, Marcsik 1983), having no clinical significance (Csákány & Forrai 1984).

In less frequent cases, when the lesion affects more vertebrae, neurological, orthopedic and urologic symptoms are involved, too (Bing 1929, Csákány & Forrai 1984, Horányi 1961). Even though modern surgical operations are at hand today, only one third of the neonates suffering from spina bifida can live up

¹ This lesion is frequently found in the Avar series, too, in the Carpathian Basin (Kőhegyi & Marcsik 1976, Marcsik 1983). In the geographic region, it is caused, first of all, by iron deficiency anaemia - a nutritional deficiency disease. On the basis of the newest investigations (Józsa & Pap 1991) its scanning microscope description is known, too.

to 5 years of age. 80% of them remain seriously, 10% slightly disabled (Mumenthaler 1989, Papp 1986). The surgical treatment of those with covered spina bifida has better prospects, but two-thirds of these patients remain disabled anyway (Papp 1986).

On the examined cervical-vertebra find, serious dysmorphism can be observed. Beginning from the atlas, the spinous process is missing from all the cervical vertebrae found. In the closure of the posterior vertebral arc, a significant hiatus can be detected (10-21 millimeters). On this basis, the find can be diagnosed as spina bifida with complete certainty. The prospects of this serious illness are unfavourable even in our days.

The closure disorders of the spinal cord are multifactorial diseases: environmental factors, too, contribute to their occurrence (Éry 1974, Papp 1986). The frequency of its incidence was about 33 thousandth some decades ago. Since then its ratio has decreased by 60-80% (Papp 1986) owing not only to prenatal screening, but to the improvement of environmental factors. The other way round: the intrauterine occurrence of spina bifida must have been much more frequent, the prognostication of those with the illness who were born much worse in the 16-18th centuries, the environmental factors (way of life, nutrition) being much less favourable then.

On the basis of the findings we consider it exceptional that a male with such a grade of serious lesion affecting the cervical section, needing care, was able to live up to this relatively old age (Althouse & Wald 1980). We have no information of similar case described in the literature.

As a consequence of the lesion, the lower limbs may have been paralysed. Bing (1945) reports spastic paraplegia about a child examined, considering cervical localisation to be extraordinarily rare (Fig. 3). Törő & Csaba (1964) publish the photo of a similar case (Fig. 4). Protrusion of the meninges and of a part of the spinal cord can be assumed, forming meningocele or meningomyelocele. The latter usually is accompanied by other developmental anomalies (e. g. hydrocephalus internus) (Horányi 1961).

About the cranium, with radiological methods, brain compression, hydrocephalus could not be proved.

On the basis of the foregoing, a high standard of socialization can be assumed of the population which used the cemetery.

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Fig. 2 The X-ray photo of the cervical vertebrae



Fig. 1 The cervical vertebrae examined

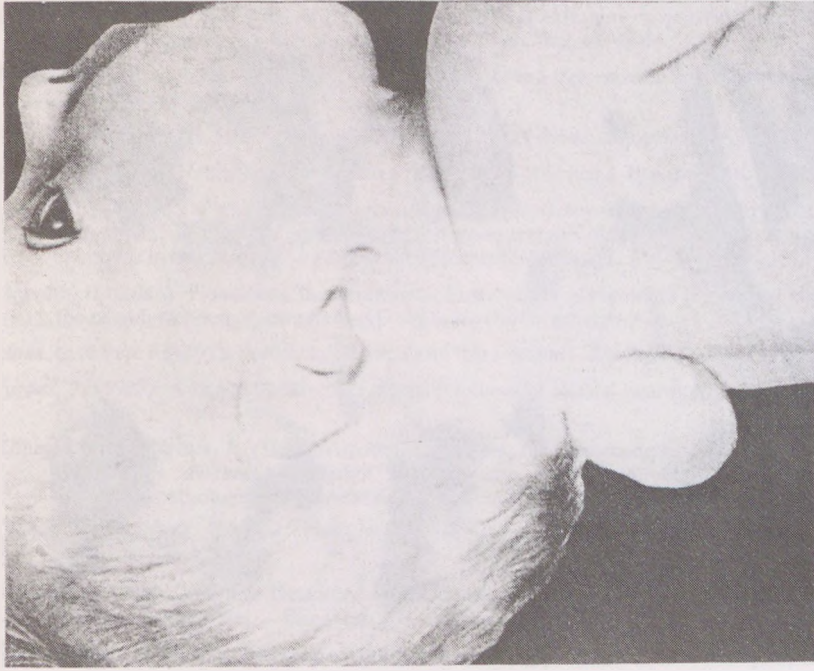


Fig. 4 Photo of the malformation from the book of Tör6 & Csaba (1964) taken by Berndorfer

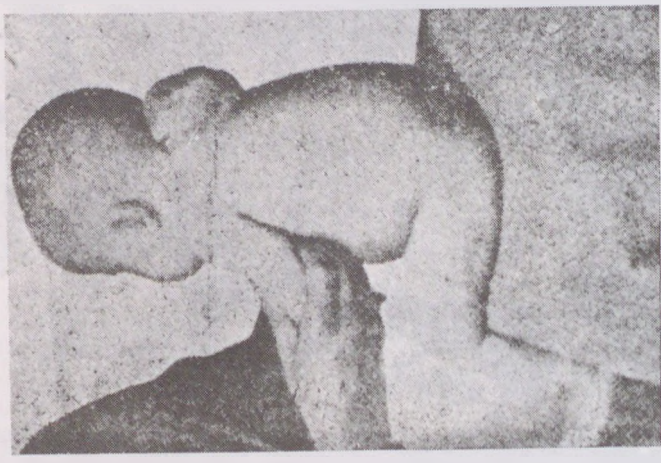


Fig. 3 Child with meningoencephalocele from Bing's book (1945)

TÖRÖK AURÉL
(1842 - 1912)



Dr Török Aurél

A biographical sketch of the life of ponori Török (Thewrewk) Aurél

(Based on the articles of L. Bartucz)

by Cs. Horváth and I. Pap, Budapest

13 February 1842	Born in Pozsony (Pressburg).
1852	Started secondary school at the Piarist grammar school of Pest.
1861	Immaculated at the register of the Medical Faculty of the University of Pest.
1863	He translated several German, French and English articles as a medical student for the periodical " <i>Gyógyászat</i> ".
1864	He went to the University of Vienna to attend the lectures of famous professors Brücke, Hyrtl, Oppolzer and Skoda.
22 October 1867	He received his medical doctor's diploma in Vienna.
1867 - 1869	He was assistant of Professor Jenő Jendrassik in the Physiological Institute of the University of Pest.
24 May 1869	He was promoted private-docent of " <i>Ébrénytan</i> " [Small beings] and " <i>Szövetfejlődéstan</i> " [Histogeny] at the Medical Faculty of Pest.
29 July 1869	He was commissioned " <i>Public ordinary Professor</i> " of Physiology, Histology and the related Medical Physics as well as Pathology and Forensic Medicine at the Surgical Academy of Kolozsvár.
Summer 1869	He visited several physiological institutes in Germany.
September 1871 - September 1872	He carried out evolutionary research on evolution in Bonn, in Tübingen and in Würzburg.
1872 - 1878	Professor of Physiology and Histology at the Medical Faculty of the University of Kolozsvár.
August 1878	He met Paul Broca at the World Exhibition of Paris.
3 December 1878	He was transferred to the Regional and Descriptive Anatomy Institute of the University of Kolozsvár. He started anthropological, anatomical and physiological research.
1879	The " <i>Természettudományi Közlöny</i> " published his first articles and reports on anthropology.
1881	He was the first to announce and to deliver regular lectures of anthropology.

1880 - 1881	He went to on a study-tour abroad. He visited Berlin, Basel, Geneva, Paris, Algiers and Regensburg. The " <i>Természettudományi Társulat</i> " [Society of Natural Sciences] commissioned him and Gyula Pethő to translate the anthropological manual of Topinard.
8 September 1881	Professor of the Anthropological Institute at the University of Budapest.
1882, Budapest	He published the very first Hungarian periodical of anthropology " <i>Antropológiai Füzetek</i> " at his own cost.
31 October 1883	He was entrusted to analyse the skeletons of the Kings from the Árpád dynasty.
1884, Breslau	He introduced several craniometric instruments of his own pattern at the Anthropological Itinerary Congress.
1890, Stuttgart	His manual " <i>Grundzüge einer systematischen Kraniometrie</i> " was issued.
1892	He obtained associateship of the Hungarian Academy of Sciences.
24 October 1898	King Franz Joseph decorated him with the Order of the Iron Crown for his services rendered at the research of the royal graves.
2 September 1912	Geneva. Death took him on the eve of a congress of anthropology.

"This life, this work served as examples in the past but they set examples for the present and the future, too. They might motivate us to look incessantly for the ways and means leading to the flourishing of anthropology still suffering such a hard fate in our country."

(Bartucz, 1962)

List of Dr. A. Török's scientific publications

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- A chromsav — mint étetőszer — alkalmazása. — *Gyógyászat* (Budapest) 4 (37): 738-739.
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- A szíverés meghatározása békánál. (Ju dée tanártól). — *Gyógyászat* (Budapest) 4 (37): 737-738.
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- Egy új bélgiliszta. (*Anchylostoma duodenale*). — *Orvosi Tár* (Budapest) 3 (6): 91-94.
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- Új nézet a fonalócok vándorlási módjára nézve. [Thudichum tanár nyomán]. — *Gyógyászat* (Budapest) 4 (47): 938-939.

1865:

- A comb világrahozott ficamának gyógytana. [Broca után]. — *Gyógyászat* (Budapest) 5 (10): 224-225.
- Agylágyulás újszülöttnél. — *Gyógyászat* (Budapest) 5 (26): 532-533.
- A lágycsérvek gyökerezésének új módja. — *Gyógyászat* (Budapest) 5 (7): 135-136.
- A mész-halv-vizegy mint zsonglító szer. — *Gyógyászat* (Budapest) 5 (10): 207.
- A szerelem-tévely és annak orvos-törvényszéki következményei. [Le Grand du Leulle tr. után]. — *Gyógyászat* (Budapest) 5 (8-10): 154-156, 177-179, 197-200.
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1867:

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1870:

A görcső. — *Magyar Polgár* (Kolozsvár) 2-4.

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1871:

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1872:

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A "kötőszöveti kérdés" mai álláspontja. — *Gyógyászat* (Budapest) 12 (19-21): 300-305, 316-321, 333-336, 12 (26-27): 409-413, 425-431.

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Ueber den Bau der Nervenfaser. — *Verh. d. Würzburger phys.-med. Ges. Würzburg* N. F. 3: 1-3.

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1874:

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A hatodik érzékről. — *Erdélyi Múzeum* (Kolozsvár) 3 (3): 44-48.

Dolgozatok a kolozsvári M. kir. Tudományegyetem Élet-szövetani Intézetéből. 1. Az állati szervezetnek élő alakegységei. Tanulmány az állati sejtelmélet felett. — Kolozsvár, 48 pp. + 1 tábla.

Kisebb közlemények az élet- és szövetan köréből: 1. Az élő sejttállomány (protoplasma, bioplasma) finomabb szerkezetéről. 2. A sejtmagok (nucleus) szerkezetéről és kifejlődéséről. — *Erdélyi Múzeum* (Kolozsvár) 3 (8): 130-132.

Die primären Differenzirungen in den Embryonalzellen bei Siredon pisciformis. — *Archiv mikrosk. Anat. Entw. Mech.* 12: 756-783.

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1877:

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1878:

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1879:

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