

SYMPOSIUM

Results of the paleostomatological researches

Gábor S. Kocsis

Clinic of Dentistry and Oral Surgery, University of Szeged, Szeged, Hungary

ABSTRACT Hungarian paleostomatology as the part of dental anthropology exists since the middle of the last century, together with the paleodontological research in the world. The name paleostomatology comes from a Hungarian scientist, György Huszár. The article has the following chapters: Introduction (what is paleostomatology, and its importance), First studies in the world, Nomenclature, The bases of Hungarian paleostomatology, Pioneers of paleostomatological studies in Hungary, Era of the study of caries and other fields of Hungarian paleostomatology, and Hungarian paleostomatology today. The most important representatives of the field are Árkövy, Bruszt, Hillebrand, Huszár, Iszlai, M Lenhossék, Schranz, Tóth, and many anthropologists, doctors, dentists and other scientists. The most researched topics are dental morphology and dental caries but the scientists deal with other fields, too, from an anthropological or medical point of view, such as the morphology and pathology of the facial bones, the alveolar changes, the tooth morphology and variations, the developmental anomalies, the dental attrition, the articulation of dentitions, and so on. In the last couple of years the level of methodology have also corresponded to international needs.

Acta Biol Szeged 44(1-4):109-122 (2000)**KEY WORDS**dental anthropology
dental paleopathology
paleostomatology
facial bones teeth

Teeth – and partly the facial bones also – are bodyparts, which mostly resist the time and influence of the surrounding circumstances. From the remains that may be found even in layers that are millions of years old, teeth are the most resistable against postmortal effects. That is the reason why they can tell us the most about the once-living creature, and about its conditions of life. So, the examination of facial bones and teeth findings originating from prehistoric and historic times is fundamentally important for the history of the origin of man and for the prehistory of diseases, which constitutes the topic of paleostomatology. Dahl et al. (1975) draws our attention to the importance of examining facial bones: “Particularly in the study of skeletal deviations, thorough investigations of dry skulls with symptoms of well-known clinical entities may provide valuable information concerning the osseous changes. Such investigations represent an important supplement to clinical and radiological studies ... and may reveal information pertinent to the identification and description of patients with microforms of the syndrome.” A number of synthetic works appeared lately concerning this area (Barnes 1994; Alt and Türp 1997), which shows the significance of the discipline. In the work by Alt et al. (1998) entitled “Dental Anthropology”, the importance of the same kind of studies is confirmed: “Jaws and teeth are more durable compared to skeletal remains (less

post-mortem decomposition, best represented part of the skeleton, record of fossil species, past and recent population), they possess a high degree of morphological individuality representing personal, familial, and population characteristics, and they can be directly observed and evaluated in both living and past populations.”

First studies in the world

Dubrue Delasalle was presumably the first to write about the study of teeth originating from excavations in 1772. Ignác Barna (1871) refers to this in his work entitled “Dentistry”, quoting Carabelli Georg’s work from 1831 “Geschichtliche Übersicht der Zahnheilkunde”. In Barna’s book the quotation is as follows: “On an excavation of a cemetery Dubrue Delasalle found that the teeth which were in the third *i.e.* deepest, oldest layer of the graves were in the best condition and those found in the upper layers were in the worst. He concluded that the difference was due to the overattentive behaviour that came with the culture and to the harm caused by all kinds of cleaning materials.”

The history of dental anthropology cannot be separated from the history of paleostomatology. So, early researchers of tooth morphology and dental phylogenetics, such as Cope, Osborn, Kükenthal, Röse, Bolk, Gregory and others (Alt et al. 1998) may also be seen as the pioneers of paleostomatology. Next to this, craniometry becomes the most important branch of the already existing anthropology, which also means the study of divergences and normal variations on the maxilla and the mandible.

Accepted February 3, 2000

*Phone: 36(62)545-295, Fax: 36(62)545-282, E-mail:Kocsiss@stoma.szote.u-szeged.hu

Mummery (1870, 1874) wrote about tooth examinations carried out with scientific claim and on a greater amount of findings originating from excavations. After this more and more publications appear on the topic. From the end of the nineteenth century Patrick (1889) and Magitot (1896) could be mentioned. They studied dental caries first of all, but examined other pathological alterations also.

Nomenclature

From the beginning of the XX. century the cultivation of this branch has been completed, and the Hungarian researchers has also taken an important part in it. The name itself – paleostomatology – was first used by a Hungarian, György Huszár. It was then recommended to international acceptance by two well-known representatives of the discipline, the Belgian Brabant and Sahly (1962), but the authors use different names. Brothwell (1963) uses the following description: “Teeth and archeology” and Janssens (1970) the “Dental disease paleodontology”. As for the Hungarian authors, Tóth (1970) thinks that we cannot talk about stomas in excavation findings, as there are almost no soft parts, so he offers rather the nomenclature “paleopatology of teeth and mandibles” or “paleodontology”. Schranz (1985) prefers the name “dental paleopatology” for diseases. In our opinion the name “paleostomatology” is also correct, as it has a broader meaning, it includes the study of not pathological cases, the mandibles and the preserved soft parts (in the case of mummies, for instance). This name is used by Capasso (1985) also.

The bases of Hungarian paleostomatology

To observe the beginnings of this discipline in Hungary we have to go back to the middle of the nineteenth century. The examinations of the time were connected to the excavations at Székesfehérvár, when the first excavator, János Érdy (1853) wrote about the healthy teeth of seven skulls, then Imre Henszlmann (1864) reported about the findings of further excavations. The examinations of remains of graves from the Árpád-era were first reviewed by Huszár (1945), then the paleopathological articles written on caries were collected by Tóth (1970). They think that the oldest representation – without the descriptions of the Székesfehérvár remains – was written by Jenő Nyári (1873), who described the remains found on the Leshegy in Pilin. József Lenhossék (1882, 1884) studied the skulls found at Szeged-Óthalom. Aurél Török (1893) was also interested in the dentition of King Béla III, and he also made Iszlai examine it.

We must not forget the scholars who made the first steps towards scientific studies in both anthropology and paleostomatology through founding a skull-collection. Besides the collecting work of Sámuel Scheiber, József Lenhossék – and last but not least Aurél Török was very important (Farkas and Dezső 1994) – dentists also collected and examined skulls.

At the second half of the nineteenth century the eccentric dentist József Iszlai (1840-1903) was a passionate collector. Besides other objects he also collected skulls. The skull-collection – which was given to the university in 1902 – is described by Huszár in his book (1965): “The obituaries said the collection was “world-famous”. I thought it was exaggeration, because as Zoltán Körmöczi remembered, the collection taking two rooms consisted “only” of 400 skulls. I had the chance in the Museum of the Institution of Anatomy to look through thoroughly the collection which has not survived the war unhurt and found it was even today rather important and valuable. Fifty years ago and in its whole glory the collection really could be interesting also in abroad. Most of the skulls are the skulls of people of different origin, mandibles showing rare dental anomalies. There are two deformed skulls in the collection, mummy-head, embalmed wildman-head, a Hungarian skull from the times of the conquest with an impacted canine tooth and so on. Hundreds of tooth showing morphological anomalies are in old match boxes and envelopes. There are also hundreds of animal skulls and gypsum models in this collection.”

The topics in the work of Iszlai are rather varied. He wrote about the root filling, trepanation, tooth transplantation, actinomycosis, hygiene of teeth. On the basis of the tooth examinations in skulls he also dealt with dental anomalies and nourishment customs of animals (Iszlai 1880, 1881a, 1881b, 1897). Salamon (1942/a) wrote about his major work: “The topic, as he wrote about craniology and odontology, with which he dealt with all through his life, is the relationship of the two sets of teeth, that is what is called in stomatology articulation. With the help of his great skull collection, he could study this relationship and its variations thoroughly and he could also systematize his results in the lecture he held at the international congress in London, 1881, in the dental session: Illustrative Skizzen zu Carabellis “Mordex prorsus” und dessen Verhältniss zur sogen. “Prognathia ethnologica” und Meyer’s “Crania progenaea” was the title.

At the beginning of 1902 it was a sensational news that Petőfi’s skull had been found. According to the description Reichenberger, an Austrian military surgeon, who cut off Petőfi’s head from his dead body on the Segesvár battle field and took it with him, gave it later to the laboratory of natural history in the secondary school at Balázsfalva. The most prominent characteristic of the skull was the protruded upper left canine tooth, about which Jókai said: “then it is Petőfi’s skull and we have to obtain it in any ways.” The skull was examined by Aurél Török, who was the teacher of anthropology at the university, then Vilibáld Semayer, director of the ethnography department of the National Museum. They asked Iszlai to give opinion on the canine tooth. He examined the skull on January 24, and summarized his view in two points. In the first he described the dental alveolus of the

canine tooth, in the second those of the first premolars. With this he made evident that the upper left canine is protruded in the skull, which is not the result of some artificial, posterior intervention. “We know today that the skull at Balázsfalva is not Petőfi’s skull” (Salamon, 1942a).

Iszlai’s first co-operator was József Abonyi (1858-1914), who wrote more works on dental subject. His summarising dental work is “A Short Handbook of Dentistry” (1892), in which he mentions that “because of the favour of the teachers Miháلكovics, Thanhoffer and Török at the department of anthropology at the university the 7,000 skulls with complete dentition, together with students of the local schools and soldiers staying in the town could be studied through looking for anomalies (Huszár 1965a).

Gerő Rudas (1856-1912) dealt primarily with dental histology; in connecton with this he examined the putrefaction and postmortal changes of teeth and bones (1899, 1899a).

Pioneers of paleostomatological studies in Hungary

We know József Árkövy (1851-1922) primarily as one of the founders of the Hungarian dental school, the founder of the Stomatology Clinic in Mária street and he belongs to those who made stomatology an acknowledged medical discipline. His work as a writer is also varied, first of all in dental themes but his article (1904), which can be compared to Mummery’s paleostomatological publications, is almost unknown. While the letter valued dental caries, Árkövy sistematically studied such characteristics on materials originating from excavations (the Tomes-Zsigmondy-diverculum on premolars, cingulum on upper lateral incisors and the foramen coecum Milleri on molars), which characteristics – he thought – changed phylogenetically according to their frequency of appearance.

The studied material in the view of excavation findings were the followings: from the teeth of 169 skulls 24 premolars for the study of diverculum (8 Roman, 3 from the time of the migrations, 3 Avar, 2 from the time of Endre I, 4 Hungarian skulls from 1550-1568, 4 skulls from Budapest from the early 1800’s); 183 upper lateral incisor tooth for the study of the cingulum (from the above described historical times); teeth from contemporary skulls and “race” skulls, which he grouped as follows: ancient Greek, Maori, Sudanese, African, Greenlandic Eskimo, East-Siberian Eskimo, Chinese, Gipsy, Roman and Bulgarian). He examined 708 upper and 519 lower molars for the foramen coecum, and teeth from the above mentioned “race” skulls. He also studied the dentition of 11 anthropoid apes. He describes his method as follows: “for the study of the diverticulum I cut the praemolars into two sagittally with an electric saw. For the others pure inspection was enough, and for the cingulum I also took the exact breadth of the crown.” In his results he stated that the examined characteristics appear with different

intensity “on the ancient and also on the race-skulls”. On the basis of his above mentioned publication Árkövy can be seen as the first Hungarian scientist, who made paleostomatological assessment in the modern sense.

Dental anatomy and anthropology had also other internationally appreciated scientists at that time. Otto Boeskey, for instance, wrote his doctoral dissertation on the palate-osteological characteristics (on 700 skulls) in 1908. The work by Jenő Hillebrand (1884-1950), who was the member of the anthropological institution at the university, appeared in the same year (1908) in Hungarian: “New data to the morphology of teeth of man”, and in the next year the same work appeared also in German. With this, the Hungarian dental anthropology and paleostomatology at the same time could show up a book in front of the international scientific audience. Hillebrand’s monography is unfortunately almost unknown even today, so we think it is necessary to introduce the work briefly.

In the introduction of this 89-page-long book the author describes the aims of his studies. The examinations were “carried out from all known morphological points of view with the most objectiveness and on such huge material, than never before (4,000 skulls and 2,000 mandibulae). I aimed at express the results also in percentages; this is very important in the case of such a big experimental material, as under the circumstances we may assume that the percentages close up to the real numbers and they give well arranged data.” In the introduction he also expresses his gratitude to Aurél Török (the rector of the university), Géza Entz (leader of the skulls-collection), József Szabó (privat-docent of the Clinic of Stomatology), Károly Gorjanovic Kramberger (university teacher in Zagreb) for their help given him in his work.

The introduction corresponds to the chapter on material and methods. According to this the material examined consists primarily of teeth from adult skulls from the time of the migrations to modern age. (He writes later, on page 69, that the number of the skulls from the modern age – the last 50 years – is one seventh of all the examined ones). For the study of sexual differences he examined 650 from the 4,000 skulls, which were “typically male or female skulls and had all the main sexual characteristics on them”. Sexual dimorphism is given only for the upper teeth.

Besides, he also examined 60 children skulls from the point of view of deciduous teeth, 100 skulls of “other human origin”, 12 anthropoid and 30 lower class monkey skulls. The thorough description of the letter is not carried out later. The author follows in the examination methods of Maximillian de Terra (1905). He mentions later on in the book (p. 22) that “I studied a hundred times larger material”. The measurements were carried out with a slide-gauge. The length (height) of teeth was not measured because of tooth attrition and the different methods of different authors. At the end of the chapture he tells about the nomenclature used by him to

describe the teeth and the surface of teeth.

Chapter I. Formation of teeth from ontogenetic and phylogenetic points of view (pp. 5-9).

Chapter II. Size of teeth (pp. 9-14). The breadth and thickness of teeth is described through the middle value, always giving also the number of the tooth.

Chapter III. (pp. 14-52). This long chapter is broken into shorter parts according to the followings:

A) Number of the knobs (cusps) that build the occlusal surface of teeth (pp. 15-23). Interstitial knobs (pp.23-25).

B) Of accessory knobs not getting into the occlusal surface of the dental crown (pp. 25-39). On molars he deals with the appearance of Carabelli cusps first of all (and the Carabelli fovea). He shows the usual differences among peoples.

He describes the – not Carabelli – supernumerary cusp appearing lingually on the M3 sup., the supernumerary cusp appearing mesiobuccally, the latter may be seen as an adhesion of a supernumerary tooth (M4). With this he preceded Bolk's description of the praemolar cusp and tooth (1913, 1914). He also describes the mesiobuccal supernumerary cusps on lower molars, which were later described by Dahlberg (1950) as protostylid.

On sulcuses, foveas and plicas appearing on dental crowns (pp. 39-52). Here he also describes the growth which he found first of all on upper lateral incisors, but occasionally also on C sup. and on I1 sup., and about which I have not found any data. This is a sulcus, which originates usually from the lower part of the crown on the lingual side of the I1 sup., and it goes through the dental neck onto the root." This character became later known in dental literature as palatal-gingival sulcus.

Chapter IV. On the roots of teeth. A) Number of the roots of teeth (52-67). In this chapter he wants to give exact data on an extended material. He studies especially the fusion of the roots of the upper teeth, he used here an own signing method. The "total conical fusion" and the "total prismatic fusion" were valued separately. Besides the teeth alveolae were also valued. He gives the number of teeth (and alveolae) examined according to the type of teeth, the absolute number and percentage of the different forms. He also deals with the connections of the number of roots and cusps.

B) Tooth pearls (Schmelzperlen) = odontoms (pp. 67-69). In the author's opinion the growth is not to be named as enamel pearls, because they build not only from enamel. He declares that they appear in different size only on upper molars, most frequently on the third molar, they are more frequent on teeth of skulls from later times, usually by men.

Chapter V. On the development of more teeth than normal (pp. 69-77). About supernumerary teeth Hillebrand argues for the atavistic theory. At the end of the chapter he talks about the concrescence, fusion and especially the twin-formation of teeth.

Chapter VI. Lack of teeth, retention and persistence of deciduous teeth (pp. 77-80). The author here deals with the so called phylogenetic reductional lack of teeth, the forms appearing because of perished dental germs, the hindered eruption and in connection with this the persistence of deciduous teeth. He describes the lack of upper middle incisors, where "in one of the cases the remained I1 sup. was in the middle of the jaw." This description may correspond to a soliter upper central incisor case (!), unfortunately without illustrations or further comments. (The first commentators of the documented anomaly are Radnai in Hungarian in 1943, Seger in German in 1955 and the Hungarian Bruszt in 1956, then Scott in English in 1958).

Chapter VII. Interesting toothspaces (diastema, trema) (pp. 80-84). A) Diastema, which shows up between the upper lateral incisor and the canine, or the lower canine and the first premolar. There is the "alveolar diastema", when there is a space also between the alveolae, and the "diastema dentalis", when the teeth only incline from each other. Hillebrand found the alveolar form in 5-5 cases on 4,100 skulls and 60 deciduous dentition. The examined 2,000 mandibulae he also observed alveolar forms in 7 cases, while the dental form characteristic to the anthropoids were not found. On behalf of that he sees only the upper diastema as atavism, the lower is variation.

B) Trema, that is the space between the upper and lower middle incisors, can be found in the author's material in 25 (permanent) and 19 (deciduous) cases. He writes that on the basis of his observations carried out on the living, it is more frequent by women.

Chapter VIII. On enamel hypoplasia and caries (pp. 84-86). Hillebrand values the above described foramen coecum and fovea Zuckerkandl as hypoplasia. These and enamel deficiency is also the cause of caries. He thinks that enamel deficiency is rather an individual (pathological) character. The stripe-form of enamel deficiency, especially on canines, is seen by him, as also by the literature, as the concomitant sign of serious illnesses, "as I found these mostly on the skulls of youngsters who died very early (at the age of 15-30)".

Appendix (pp. 87-89). After having finished writing the study, during the typographical work appeared a work by Adloff (1908) with the title "Das Gebiss des Menschen und der Anthropomorphen". Hillebrand gives the critical summary of the book. He adds that Adloff also described the sulcus that appears on the upper lateral incisor and goes on to the roots.

The above described, fundamental work by Hillebrand remained unfortunately almost completely unknown for the international paleostomatology. Schwerz, a Swiss scientist, recognized the values and usefulness of the work: "As in the near surroundings there were no similar works or material to compare, I was obliged to quote a Hungarian work. E.

Hillebrand studied the teeth of the anthropological collection in Budapest thoroughly. This work remained unfortunately almost unknown." The works by Schwerz (1914) "Über Zähne frühhistorischer Völker der Schweiz" then in 1916 "Morphologische Untersuchungen an Zähnen von Alamannen aus dem V. bis X. Jahrhundert" build similarly to Hillebrand's study and made comparisons to his results in the text and in the charts.

We can find also later references to Hillebrand's work which are the results of first of all in Lenhossék's description of the work (see later). His data were quoted by Fabian (1928), Wiedenreich (1937) and Pedersen (1949). The most important of these is Visser's even today world-famous work (1948) on the morphology of roots. The morphological description by Schulze (1970), which is also well-known and widely referred to, we still meet Hillebrand's name.

After Hillebrand's work, the next most important study of the Hungarian paleostomatology came out in 1917 with title: "Destruction of teeth by dental caries in the past and in the present", and was written by Mihály Lenhossék (1863-1937), who was an excellent anatomist. The study became internationally known and referred to. The author examined 1,690 (1,190 + 500) skulls. From the exhumed material of the old "cemetery of Vác" there were 755 skulls. The cemetery was used between 1777 and 1849, the remains were collected by Aurél Török in 1882. Lenhossék valued 260 skulls from the findings of Rákospalota, which originate from the Árpadian Ages, from the 11th-13th centuries. From the findings in Nemesvölgy and Keszthely (4th-5th centuries, Migration Ages) he used 101 skulls and from the Roman Ages 74 skulls were used, from different cemeteries. Five hundred anatomical skulls, which were also examined, were not included in the comparative work.

He deals with the frequency of caries above all in the study, for this – as Tóth writes in his critical article in 1968 – we must accept his methods as adequate and his data as authentic. Opposite to Mummery's work mentioned in the introduction, Lenhossék also took into consideration in regard to the number of teeth aplasy and retention, for the first time he pointed at the importance of postmortal loss and to lessen the percentage of mistakes, he rather does not write about third molars. Tóth (1968) thinks, that there are more mistakes in his values, for instance he did not take into consideration the postmortal loss here, at the same time the missing teeth were regarded as being carious in every age groups. In spite of these defects, the study is still of great importance, as the author started the caries-examinations within paleostomatology in Hungary and showed a way how to make the methodology of these examinations more delicate. He also draws attention to the need of examination of children's dental care in schools: "I finish my article with the wish that after the war this movement would start also in our country and had great practical results."

Lenhossék used other data from the above described experiment material for another work: in "Handbuch der Zahnheilkunde" (1922), in the chapter "Makroskopische Anatomie", which is also referred to even today (e.g. radix entomolarica Lenhosséki; the frequency of appearance of two-rooted lower canines, etc.). In the chapter the author describes the development and macroscopical anatomy of face and mouth cavity and mostly he deals with the thorough description of teeth and dentition (pp. 97-239). Shorter chapters that belong also to paleostomatology are "Zur Anthropologie des Gesichtsschädels" (pp. 239-246), "Die Alveolen" (pp. 246-257) and "Die Abnutzung der Zähne" (pp. 279-284). It is interesting to talk about another chapter now that tooth-jewellery is so fashionable: "Die künstlichen Verunstaltungen der Zähne" (pp. 284-288). In the above mentioned chapters Lenhossék talks about the skulls, which he studied for his results, there are a number of and illustrations and photos about them (e.g. the illustrations 71/a-c, 129/a-b, 148, 149). At the beginning of the paragraph on alveolae he writes that teeth easily fall out of fossile skulls, especially the one-rooted and the fused ones; the teeth that have more roots are movable but remain in their place. Describing permanent teeth morphologically he usually gives the number of teeth studied, sometimes he also gives the number of skulls. By deciduous teeth he mentions that he had examined 53 children skulls (p. 215). For valueing the pulp-canals with the help of his assistant Ferenc Kiss, he observed 923 teeth from thousands with the so called corrosion-method (pp. 110-111). He writes down Hillebrand's data by the description of the various tooth-types (the number of teeth examined and the results, too), creating a chance for Hillebrand's work to become well-known. The above cited authors refer to Lenhossék in their works, of course, there are even some basic works, in wich we can find him, e.g. Lukomsky's (1929) work on dental caries, or the description by Dreyer-Jorgensen about the morphology of deciduous teeth (1956). Huszár and Schranz (1952) think that Lenhossék's article is also referred by German, Danish, French, English, Polish, Skandinavian and Czech examiners. Lenhossék made a great and generous favour to the international introduction of the scientific literature of Hungarian dental paleopathology.

Era of the study of caries and other fields of Hungarian paleostomatology

Lenhossék's article dealing with dental caries made the wheels of the anthropologist – and dentist-society – turn towards observations of the same kind. The international scientific life also contributed to this, of course (Huszár and Schranz 1952). The skull-collections of Hungary (from the age of the Conquest and the Árpáds) were valued on the first place, which studies were first summarised by Huszár in 1945 with the title: "The Dentition of the Hungarian Population of the Árpadian Age". The descriptions quoted here are

about the carious-state of a couple of skulls. A study as great of importance as Lenhossék's was first accounted of by Bruszt in 1950 (1950/a) in which he examined 318 skulls from the 10th-12th centuries. In 1952 Huszár and Schranz published "Prevalence of Dental Caries in West Hungary from the Neolithic Age to the Modern Times". In this work they processed the data of 1,755 skulls. The publication deals especially with the method of the study, and how the data were valued. Data were also collected about the pathogenesis of caries. After valuing 531 children skulls, in an article with the title "Die Kinderzahnkaries der Vergangenheit in Ungarn" (1958) the caries in children's teeth was dealt with. Besides the works of the above mentioned and other authors from 1966, Tóth also observed the teeth of skulls originating from excavations from the point of view of caries, the results of which observation he made known in a book in 1970: "The Epidemiology of Dental Caries in Hungary". He summarised with it the examinations carried out in this field. Károly Tóth (1914-1992) worked for the Clinic of Dentistry and Oral Surgery of Szeged from 1950. The most significant field of his scientific work was caries-prevention, for which in the above mentioned work he summarised the results of a series of examinations in the epidemiology of caries. He thoroughly describes the methodology and history of paleopathology, describes the results of studies which are related to Hungary on the material from prehistoric ages to our times. In his own studies on the material from the excavations around Szeged he valued 257 dentition from the 7th-8th centuries and 266 from the Árpáadian Age with a view to the caries. The monograph may be seen as a fundamental work in paleostomatology which is about caries and all aspects of it, such as postmortal loss, age groups, sexual dimorphism, the relations to the type of teeth, the difference of the caries on different dental surfaces etc. Tóth examined also the state of the processus alveolaris on these skulls (1966). After the publication of this monograph, he reported about the state of the dentition of 97 further skulls from the Bronze Age (1972).

From Lenhossék's work till the 60s – which was the time of caries studies – there were also other paleostomatological articles with other themes. On the basis of a bibliography collected according to the different branches of the science (Kocsis 1989) there were examinations on the morphology of facial bones, dental anthropological descriptions, including the dentition of famous people, tooth abrasion, parodontal dysplasias, dental caries, resulting bone alterations, pseudopathological alterations and experimental descriptions.

Henrik Salamon (1865-1944) was an outstanding figure of the Árkövy-school. He was first dental technician, and had a close relationship with Iszlai. In 1899 he received his diploma in medicine, and started working for Árkövy's clinic. He also worked for the Szabó-clinic. His literary work is rather extensive, his articles on the history of dentistry are

of great importance, which can be divided to more groups. The most extensive is the history of the Hungarian dentistry (1942a), then the study of the pioneers of Hungarian dentistry and their family, the dental-historical description of great people of our history, such as Petőfi, king Mátyás, Lajos II, Ferenc Liszt, the wife of Ferenc Rákóczi II and the field-marshal Alvinczy (1923, 1938, 1940a, 1940b, 1940c, 1941, 1942b). József Szabó (1874-1937) became the leader of the Clinic of Stomatology after the death of Árkövy, from 1919 to his death. His contemporary, Gusztáv Morelli calls this time the "Szabó-Salamon era", referring to the friendship of the two scientist, who discussed all problems of the clinic and professional life. This may also explain Szabó's taking part in the description of the mandibulae findings at Subalyuk (1934, 1935).

The Institution of Stomatology of Erzsébet University at Pécs was founded in 1938. In the first ten years Lajos Kollár assistant made an important scientific work in the institution, he was the first to value the facial bones of Zengővárkony, originating from the neolithic period (1948). In the study he writes about the morphology of the mandibulae and teeth of 38 skulls and the pathological alterations on teeth and facial bones.

Talking about caries studies, we have already mentioned the names Bruszt, Huszár and Schranz. They are also important personalities of Hungarian paleostomatology. Pál Bruszt (1906-1979) made especially cariological examinations, and – as he writes in 1975 – he also studied the special pathology of teeth. He lived and worked in Baja, inspite of this he examined collections from all parts of the country. We have already introduced some of his articles about caries, after Lenhossék's, his material was first outstanding statistically. His next article (1952) which analyses the caries in skulls from the 7th-13th centuries, deals with 1,128 dentitions. The study and dental examination of the findings from the late Roman times (1958), which were excavated in Győr, and the origin of the bone remains of the people who fell in the battle of 1552 and are held in the "bone niche" in the castle of Eger, were introduced in 1966. In his works he deals with methodological questions of caries-statistical analyses, too. From dental anomalies he describes the formation of "dens in dente" on excavation findings on a left upper lateral incisor from the Árpáadian Age (1950b), a double-rooted right upper permanent canine on a skull from the 18th century (1953a), the duplication of upper deciduous canines on a child's skull from Subalyuk and on another from the Árpáadian Age (1953b).

György Huszár (born in 1911) is the name-giving father of the discipline (Brabant and Sahly 1962). He graduated in 1935 at the Faculty of Medicine at the University of Szeged, between 1932-36 he was already assistant at the Department of Anthropology of the Anatomy Institute of Szeged, which was led by Ferenc Kiss. During his years as medical student

four anthropological articles appeared by him, e.g. the above mentioned one in 1933 together with Sziráky. Between 1945-46 the first three almanacs to substitute the Dental Review were edited by him and in 1946 he took part in the reappearance of the scientific review. He takes part in the editing ever since, and also in the publication of studies in connection with our branch, such as paleostomatology and history of dentistry. With the latter he has been dealing with since 1945 and has written more than seventy articles on the theme so far. With his dissertation "The history of Hungarian dentistry in the 19th century" he became a candidate 1960, then in 1965 his monography appeared with the title: "A history of Hungarian dentistry" (1965a). He is the vice president of the Hungarian Society of the History of Medicine. His first summarising work in the field of paleostomatology was "The Dentition of the Hungarian Population in the Árpáadian Age", which appeared in 1945. From this time on together with Dénes Schranz and also alone he studied the skulls in the anthropology-cabinets and in museums. Besides the already mentioned and other articles on caries (1961, 1965/b, 1966, 1967) Huszár studied the morphology of the torus palatinus mainly on excavation material (1951), all together on 1,200 bony palates, which were from cemeteries from the age of migrations to the 19th. century (only 135 anatomical product were from the end of the 19th century). In this article Huszár mentions that "The study of the 1,200 cases made it necessary to look through a lot more skulls in number, as some of the bone remains from the cemeteries are damaged and without the palate." Sexual differences with a special view to the teeth were examined together with László Molnár in 1953, for which the dentition of 100 skulls was also valued besides the dentitions of living people. Then he started to deal with tooth attrition (Molnár 1954, 1955; Molnár and Schranz 1968, 1972, 1974a, 1974). In the case of 284 children skulls from the Neolithic Age to the Middle Ages, and 240 adult skulls were examined from the point of view of abrasio, for which he also offered an own grouping system (1969). He also valued paleostomatologically some skull series, as in the case of the findings at Fonyód from the late Middle Ages (1963). His academic doctoral dissertation (1976) was also held on the examination methods and results of tooth attrition, on the basis of which he became the Doctor of Medicine in 1978. Lately he has been dealing with the history of medicine and writes articles on this theme.

Dénes Schranz (born in 1904) became a doctor in 1928, but he had been working for the Institute of Anatomy on Budapest since 1925, and from 1927 for the Medical Institute of the Law Courts, and only from 1938 for the Clinic of Stomatology. In 1944 a monography of his appeared with the title: "Forensic Stomatology", about which he writes later in an article (1987): "With the appearance of this book the dental jurisprudence – with modern expression: forensic dentistry – gained its own rights also in our country". In 1948

he became an honorary lecturer in forensic dentistry. Some chapters of the above mentioned monography are already related to his dental paleopathological studies, such as defining age, defining identity concerning stomatology and genetics and the postmortem changes of mouth formation. For his dental genetical examination a stabil basis was given by skull and paleo-dental observations. Of these two important border fields of stomatology, *i.e.* of forensic dentistry and oral genetics, Schranz accounted at a lecture held in remembrance of Árkövy (1994), where the audience could learn also the following "I mention for the sake of completeness that there was a third border field also, in which I worked not alone but together with György Huszár in museums between 1945 and the 50s: dental paleopathology, the stomatological branch of paleopathology. A fourth one, in which I worked with László Molnár and György Huszár, being gerostomatology. Our German book entitled "Gerostomatologie" came out in 1962". The main direction of the examinations of the dental paleostomatological studies besides the already mentioned caries studies is the definition of identity on the basis of dental reports (1953), the tooth illnesses of the prehistoric man (1954, 1955 with Huszár), examination of periodontium illnesses with the help of casts of prehistoric findings (1962), examination of tooth attrition (1967), and the examination of the bone remains of King Béla III. regarding the teeth, also with the help of casts (1988). Lately professor Schranz deals with the genetical questions of dentistry, about which a synthetic monography appeared in 1991.

Gyula Regöly-Mérei's (1908-1974) work is outstandingly important in the field of paleopathology, within this in paleostomatology. He graduated from a medical university in 1934. He had the qualifications of a pathological anatomist, of a surgeon, and that of a otorhinolaryngologist, he also dealt with the history of medicine, he was the vice president of the Hungarian Society of the History of Medicine between 1968 and 1972. He made description of teeth also in own articles (1958, 1970), but in his book entitled "Systematic pathology of primeval men and of later human remains", which appeared in the Paleopathology-series, he writes distinctly also about pathological stomatology (1962). The 22-page-long chapter is divided into subchapters: dentitio, anomalies of the growth of teeth, abrasion of teeth, caries, parodontitis, senile atrophy of facial bones, and dental abscesses, cysts and fistulas. Besides making known the important data of the Hungarian and other literature, he also carried out own examinations on findings originating from the neolithic period up to the Middle Ages. His data are summarised in charts, and he also describes the pathological cases.

Besides the above mentioned outstanding paleopathologists we also mention other names, who appeared with one or more articles or parts of books in one of the branches.

Simon and Kőműves (1937) studied the size ascending ramus of the mandibulae and the postural variations, Szokolóczy (1937) also studied the size of the ascending branch on 105 mandibulae, Molnár (1939) the abrasion of teeth, Máthé and Molnár (1940) the articulation of used teeth originating from excavations. Pór (1948, 1953) carried out examinations on excavational findings with the mercurial volume-meter constructed by him. Kocsis (1948) examined the lingual foramen on the inner surface of 700 mandibles. Szokolóczy (1953) carried on with his bone examinations by defining the lingua-level on 100 mandibulae. Somogyi (1953) studied one sided developmental anomalies on 1,000 mandibulae, from which 200 were anatomical. Balogh and Csiba (1966) studied the areal anatomy variations of “area perilingularis” on hundreds of mandibulae originating from the 4th to the 19th century. Dobrovits and Kemény (1971) valued the topography of the retromolar area on 250 mandibulae. Berendorfer (1962) described a 500-year-old skull with a cleft lip, Prágai and Fazekas (1982) valued the involutory changes of size on toothless mandibles, by 100 macerated and 114 excavational findings. Lengyel (1964) wrote about chemical, serological and histological examinations, Nemeskéri and Harsányi (1968) about cremated findings.

Important is the taking part of anthropologists in paleostomatological studies. Already at the beginning of the century besides the mentioned scientists (Török, Hillebrand and others), Bartucz described the mandibulae of the Weimar caveman (1914) the mortal remains of Ferenc Rákóczi II. (1935), and the skeleton of a Hungarian conqueror of Heves (1939), and we can find a number of dental descriptions in his book “Praehistorical Trepanation and Grave Findings Connected to History of Medicine” (1966). Malán (1929) studied the skulls from the Neolithic at Lengyel in his theses, Hungarians of the 10th century (1941) and described the tooth germ of Istállóskő (1955). Besides the article that includes dentition description by the above mentioned Nemeskéri (1943, 1951), he also took part in writing paleostomatological articles (Nemeskéri and Regöly-Mérei 1958; Nemeskéri and Brabant 1963). Thoma made known the dentition of the child of Subalyuk (1963) and the tooth findings of Vértesszőlős (1967). In one of his articles (1966) and in his book “Graves, Bones, People” (1969) Kiszely deals with paleostomatology. Olga Bottyán carried out important osteological examinations. She studied the morphology, size and sexual dimorphism of the palatal surface of maxillas on 368 skulls from the 6th to the 9th century and 361 skulls from the 10th to the 15th century (1974/a), and on 500 mandibulae she studied the changes in size that take place with aging and also the sexual dimorphism (1974, 1975). Ildikó Pap (1986) deals with the dentition of the Hungarians in the Middle Ages. Anthropologists who describe a series anthropologically and paleopathologically, usually write down the cariological and attritional status and in some cases that of the develop-

mental anomalies also. The above mentioned bibliography (Kocsis 1989) summarises these examinations.

From a wider point of view we may regard those articles, besides those which deal with the description of human dentition, which deal with the dentition of cavemen and apes or the ancestors of these, as works that belong to the field of paleostomatology. From the Hungarian author Tasnádi-Kubacska let appear the following book of the Paleopathology Series: “Pathology of Fossil Animals” (1960). The description of dental illnesses gained an important place in this work. The writer also wrote an article on the prehistoric ape finding of Rudabánya (1967), Kretzoi (1975) and Kordos (1997) wrote about the same subject.

Hungarian paleostomatology today

In the course of the last fifteen-twenty years on the basis of the subject matter of paleostomatological articles, new goals, new fields and new examination methods have born. Some of the scientists observed the mandibulae for interventions of oral surgery, e.g. Tamás (1986) studied the position of canalis mandibulae on the X-ray pictures of ramuses of 82 mandibles for defining the ideal place of the operation. Panyi et al. (1989b, c, 1991a, b, c) valued the size of 467 mandibulae from the 12th-16th centuries from different points of view, for designing jaw replacements. The latter authors developed a new measuring device for jaws and teeth (1989a).

A number of scientists urge the study of facial bones – together with the examination of the alterations of the axial skeleton – Antónia Marcsik (1976) described the anomalous skull of Izsák, then with Kocsis (1985) she studied the appearance of the Stafne’s mandibular cavity on findings from the Avar Age. Change in size and symmetry by facial bones of deformed skulls were studied by Jójárt (1988) in his thesis. Szentpétery, Kocsis and Marcsik (1990) examined the double mandibular condyle on 1,882 lower jaw. Kocsis, Marcsik and Mann (1992) described idiopathic bone cavity on the posterior buccal surface of the mandible first in the literature after having examined 8,282 mandibles, then Kocsis and Marcsik (1996) wrote again about the cavity formation on the surface of the lower jaw. Facial defects appearing on excavational findings with or without syndromatic occurrence were described by Marcsik and Kocsis (1979, 1995, 1996) and with Andrea Hegyi together (1998, 1999).

Developmental anomalies of teeth and dentition and the so far not examined forms of these are also studied today. Kocsis and Marcsik examined enamel formations (1980, 1981, 1983a), positional anomalies of teeth (1982), the dens invaginatus (1983b) and the appearance of this together with the palatal-gingival groove (1991, 1993), the appearance of the double-rooted lower caninus (1984, 1995), enamel hypoplasia (1992), which Kocsis and Mari studied the palatal-gingival groove on archeological findings (1988).

Horváth et al. (1995) wrote about taurodontia and enamel hypoplasia. Summarizing works were also written on this subject. Marcsik (1983) wrote in her candidate's dissertation "Paleopathology of the Avar Age at the Territory between the Danube and the Tisza" about the enamel formations found on the molars of 345 skulls, and described the Stafne-defect on the basis of the examination of 1,495 mandibles. Kocsis in his candidate's dissertation (1994) valued the developmental anomalies of permanent frontal teeth on the dentition of 1,997 skulls. With the evaluation of the co-appearance and accumulation of anthropological characteristics and anomalies of teeth Kocsis does genetical group formation, "hereditary studies", the division of cemeteries on this basis, *i.e.* the grouping of graves in some of his works (1988, 1994, article of Algyó in press).

With the evaluation of the anthropological material of some cemeteries the paleostomatological description of these have grown in number. Kocsis described the neolithic skulls of the Gorzsa-Czukur ranch (1988), the dentition of the skull of Kunbábony (1992), then the paleostomatology of the anthropological findings of Ópusztaszer-Monostor (1998), the description of the findings of Algyó from the age of the Conquest is not published yet. Kocsis and Trogmayer (1986) give the paleostomatological description of the findings from the Neolithic and Copper Age on the Vésztfő-Mágó Hill, Ildikó Szikossy (1999) gives that of the Vörs-Papkert B cemetery, Szikossy and Bernert (1996) describe the Kereki-Homokbánya cemetery. Kocsis and Oláh (1995) and Marcsik and Kocsis (1998) took part in the description of not Hungarian findings. The evaluation of the kings' graves re-excavated in 1984 and that of the anthropological findings of the Romkert of Székesfehérvár (Éry et al. 1999) and the mummies of Vác from the 18th-19th centuries (Szikossy et al. 1999) are in progress.

Within the interdisciplinary examination works that are connected to paleostomatology Józsa and Pap (1989) studied the stress indicator character of dentition, Fóthi and Pap (1990) examined it from the point of view of the lifestyle, and Marcsik, Kósa and Kocsis (1992) studied the chances of age definition with the help of tooth transparency. Grynaeus (1996) in his monography entitled "Isa por... Diseases and Treatment of the Hungarians of the Conquest Period and of the Árpadian Age" wrote about the illnesses and the reasons of those by our ancestors, taking into consideration also the results of history, archeology, anthropology, demography and linguistics. One of the chapters of this work "Illnesses of Teeth" deals with the different pathological forms from this point of view, on the basis of literary data.

Pap et al. carry out the microscopical examination of tartar, by revaluating the findings of Subalyuk (1995). Török et al. (1998a, 1998b, 1999) and Pap et al. (1999) do the same in connection with the findings of Vác. These studies really represent the future methods, which we hope will be more

and more well known and used in the Hungarian paleostomatological examinations. Such methods are radiographic, CT, scanning electron microscopical methods and DNA examinations (Eiben and Pap 1998).

The examination of developmental anomalies of teeth and paleostomatology in general are the favourite subjects for students to write their theses on, like Szarvas (1981), Baglyas (1986), Endrész (1986), Jójárt (1988), Hajós (1989), Balázsik (1992), Kiss (1992), Négyessiné Gonda Katalin (1993), Pelsőczy (1993), Szikossy (1993), Török (1993), Gregor (1994), Babarczy (1995), Békési (1995), Gyurkó (1995), Bernert (1996), Mátyás (1996), Szokol (1996), Maczel (1998), Török (1998), Ungvári (1998), Bíró (1999), Lichthammer (1999), and Tari (1999). Promising articles and Ph.D. works are also written by young scientists: Szikossy (1993, 1996, 1999), Molnár (1995, 1998), Bernert (1996), Maczel (1997, 1998), Hegyi (1998, 1999) and hopefully by others also.

An international acknowledgement of Hungarian tooth anthropology and within this paleostomatology can be felt partly from the part of the invited lecturers on congresses, from articles and quotations from these, partly from the appreciations in different publications. Brabant and Sahly (1962) list from the Hungarian scientists Lenhossék, Nemeskéri, Schranz and Huszár. In the Dental Anthropology Newsletter in May, 1993 Kósa wrote with the title "Directions in dental anthropological research in Hungary, with historical retrospect", in which Kocsis's bibliography (1989) was also presented. Barnes (1994) in his monography quotes Szentpétery et al. (1990) who wrote on bifid condyles, Alt et al. (1998) in their book also refer to an article by Marcsik and Kocsis (1992) on enamel hypoplasia. The book entitled "Die Evolution der Zähne" (Alt and Türp 1997) names Marcsik as the Hungarian representative of tooth anthropology, and mentions Kocsis from the examiners of tooth pathology cooperating with the clinics. We hope, these kind of quotes are going to grow in number in the future.

References

- Abonyi J (1892) A műfogászat rövid kézikönyve (A Short Handbook of Technical Dentistry). Budapest, Dobrovsky és Franke.
- Adloff P (1908) Das Gebiss des Menschen und der Anthropomorphen. Julius Springer, Berlin.
- Alt KW, Rösing FW, Teschler-Nicola M (1998) Dental Anthropology. Fundamentals, Limits, and Prospects. Springer, Wien 1:19-21, 299.
- Alt KW, Türp JC (1997) Die Evolution der Zähne. Phylogenie - Ontogenie - Variation. Quintessenz Verlags-GmbH, Berlin, 40-41.
- Árkövy J (1904) Die Bedeutung des Diverticulum Tomes-Zsigmondyi, des Cingulum an den oberen lateralen Schneidezähnen und des Foramen coecum molarium (Milleri) in phylogenetischer Beziehung. Österr Ungar Viertelj Zahnheilk 20:13-34.
- Babarczy K (1995) Ásatási leletekből származó praemolaris fogak alaki rendellenességeinek és anatómiai variációinak jellemzői és azok előfordulási gyakorisága (Morphological anomalies and anatomical variations and their prevalence in praemolar teeth originating from excavations). Szakdolgoz SZOTE, Szeged.

- Baglyas B (1986) Zománchypoplasia vizsgálata az avarkorból (Examination of enamel hypoplasia from the Avar period). Szakdolg JATE, Szeged.
- Balázsik K (1992) Fogazati rendellenességek vizsgálata avarkori koponyákon (Examination of dental abnormalities on skulls from the Avar period). Szakdolg SZOTE, Szeged.
- Balogh K, Csiba Á (1966) Az "area perilingularis" tájbonctani variációi (Anatomical variations of "area perilingularis"). Fogorv Szle 59:289-293.
- Balogh K, Molnár L, Schranz D, Huszár Gy (1962) Gerostomatologie. Akadémiai Kiadó-JA Barth, Budapest-Leipzig.
- Barna I (1871) Fogászat (Dentistry). Pest, Deutsch-féle könyvnyomda Rt, 17.
- Barnes E (1994) Developmental Defects of the Axial Skeleton in Paleopathology. Colorado Univ Press 166.
- Bartucz L (1966) Palaeopathologia III. A praehistorikus trepanáció és orvostörténeti vonatkozású sírleletek (Palaeopathology III. Praehistorical trepanation and grave findings connected to history of medicine). Medicina, Budapest.
- Bartucz L (1939) A hevesi honfoglaló magyar csontváz (The skeleton from the Age of the Hungarian Conquest, disinterred in Heves). Folia Archeol, I-II. Magyar Tört Muz, Budapest, Egyházmegyei nyomda, Veszprém.
- Bartucz L (1935) II. Rákóczi Ferenc hamvai (Mortal remains of Ferenc Rákóczi II). Ttud Közl 67:214-222.
- Bartucz L (1914) A weimari ősember állkapcsa (Mandible of the primeval man of Weimar). Ttud Közl 46:154-156.
- Berndorfer A (1962) A 500-year-old skull with cleft lip. Br J Plast Surg 15:123-128.
- Bernert Zs (1996) A Kereki-Homokbánya avar kori temető paleodemográfiai és paleostomatológiai vizsgálata (Paleodemographic and paleostomatological examination of a cemetery from the Avar period in Kereki-Homokbánya). Szakdolg ELTE Embertani Tanszék, Budapest.
- Békési A (1995) A tej és maradék moláris fogak alakjainak vizsgálata avar kori koponyákon (Examination of morphological anomalies and anatomical variations on deciduous and permanent molar teeth of skulls from the Avar period). Szakdolg SZOTE, Szeged.
- Bíró A (1999) Lesencetomaj-Piroskereszt Keszthely-kultúrájának temető embertani rekonstrukciója (Anthropological reconstruction of the Keszthely-culture cemetery at Lesencetomaj-Piroskereszt). Szakdolg ELTE Embertani Tanszék, Budapest.
- Bocskay O (1908) Összehasonlító vizsgálatok az emberi csontos szájpada osteológiai sajátosságairól (Comparative examinations on the human bony palate). Stomat Közlelőny 7:36-68.
- Bolk L (1914) Odontologische Studien II. Die Morphogenie der Primatenzähne. Eine weitere Begründung und Ausarbeitung der Dimertheorie. Jena, Verlag v Gustav Fischer.
- Bolk L (1913) Odontologische Studien I. Die Ontogenie der Primatenzähne. Versuch einer Lösung der Gebissprobleme. Jena, Verlag v Gustav Fischer.
- Bottyán O (1975) Lebensalterwandlungen der Mandibel. Ann Hist nat Mus Nat Hung 67:333-342.
- Bottyán O (1974/a) A csontos szájpada (palatum) vizsgálatának eredményei (Results of the examinations of the bony palate). Anthropol Közl 18:29-34.
- Bottyán O (1974/b) The Sexual Dimorphism of the Human Mandible. Ann Hist nat Mus Nat Hung 66:403-411.
- Brabant H, Nemeskéri J (1963) Étude anthropologique et stomatologique d'une série de crânes d'âge hunnique découverts à Mőzs (Hongrie). Bull Group int Rech sci Stomat 6:317-338.
- Brabant H, Sahly A (1962) La paleostomatologie en Belgique et en France. Acta Stomatol Belg 59:285-355.
- Brothwell DR (1963) Digging up Bones (the excavation, treatment and study of human skeletal remains). London, W Clowes & Sons 112-121.
- Bruszt P (1975) Több évtizedes tudományos munkásságának tézisei (Theses of his Scientific Work lasting for Decades). Baja
- Bruszt P (1958) A Győrött feltárt késő-római kori csontvázleletek vizsgálata fogszuvasodás tekintetében (Dental examination of the skeletal remains from the late Roman period, disinterred at Győr). Anthropol Közl 1:39-50.
- Bruszt P (1956) Die Selbstregelung der Zahnreihe nach dem Verlust des oberen mittleren Schneidezahnes im Wechselgebiss. Schweiz Mschr Zahnheilk, 66:926-930.
- Bruszt P (1953a) Kétfőkövér felső szemfog (Double rooted upper canine tooth). Fogorv Szle 46:146-147.
- Bruszt P (1953b) Über die Verdoppelung der Milchzähne. Dtsch Stomatol 3:47-49.
- Bruszt P (1952) 1128 a VII-XIII. századból származó koponya vizsgálata a fogszuvasodás szempontjából (Dental examination of 1,128 skulls from the 7th-13th centuries). Fogorv Szle 45:72-77, 105-112.
- Bruszt P (1950a) Untersuchungen über das Vorkommen von Zahnkaries an Schädeln aus dem X-XII. Jahrhundert. Öst Z Stomat 47:483-490.
- Bruszt P (1950b) Über die Entstehung des "Dens in Dente". Schweiz Mschr Zahnheilk 60:534-542.
- Bruszt P, Kőhegyi M (1963) Az egri vár "csontfülkéjében" őrzött, az 1552-es ostrom alatt elesettek csontmaradványainak eredete és fogászati vizsgálata (The origin and dental examination of the skeletal remains of Hungarians killed during the siege of 1552 discovered in the fortress of Eger). Commun Bibl Hist Med Hung 45-46.
- Capasso L (1985) L'origine delle malattie. Marino Solfanelli Editore, 277-296.
- Dahl E, Kreiborg S, Björk A (1975) A morphologic description of a dry skull with mandibulofacial dysostosis. Scand J Dent Res 83:257-266.
- Dahlberg AA (1950) The evolutionary significance of the protostylid. Amer J Phys Anthropol 8:15-25.
- Delasalle D (1772) Journ de Med Tom 38 Pag 399, cit: Carabelli G (1831) Geschichtliche Übersicht der Zahnheilkunde, Bd I. Wien 47.
- Dobrovits T, Kemény I (1971) Mérések a retromolaris tájék csontfelszínén (Measurements on the bone surface of the retromolar area). Fogorv Szle 64:205-212.
- Dreyer-Jorgensen K (1956) The Deciduous Dentition. A Descriptive and Comparative Anatomical Study. Kobenhavn, Bianco Lunos Bogtrykkeri A-S. Acta Odontol Scand Vol 14, Suppl 20.
- Eiben O, Pap I (1998) A magyar biológiai antropológia helyzete a 20. század végén (Position of the Hungarian Biological Anthropology at the End of the 20th Century). Antropológiai Bizottság beszámolója a MTA Biológiai Osztálya számára.
- Endrész F (1986) Parodontológiai csontelváltozások vizsgálata Árpád-kori koponyákon (Examination of parodontal bone alterations on skulls from the Árpadian Age). Szakdolg SZOTE, Szeged.
- Érdy J (1853) III. Béla király és nejének Székes-Fehérvárott talált síremlékei (Relics of King Béla III. and those of Queen Anne Discovered at Székesfehérvár). In Kubinyi F, Vahot I, ed., Magyarország és Erdély képekben. Pest, Emich G Könyvnyomda, I köt, 42-48.
- Éry K, Marcsik A, Nemeskéri J, Szalai F (1999) Embertani vizsgálatok III. Béla és Antiochiai Anna földi maradványán (Anthropological Examinations on the Mortal Remains of Béla III. and Anna Antiochiai). In Csérményi V, szerk. 150 éve történt ... III. Béla és Antiochiai Anna sírjának fellelése. Székesfehérvár, Regia Rex Nyomda 9-15.
- Fabian H (1928) Spezielle Anatomie des Gebisses. Leipzig, Werner Klinkhardt.
- Farkas LGy, Dezső Gy (1994) A magyar antropológia története a kezdetektől napjainkig (A History of the Hungarian Anthropology from the Beginnings to Our Days). Szeged, JATEPress 10-24.
- Fóthi E, Pap I (1990) Changes of way of life during the 6-12th centuries in the territory of Hungary. Annlis hist nat Mus Nat Hung 82:259-269.
- Gregor B (1994) Számfeletti fogak vizsgálata ásatási anyagokon és élőkn (Examination of Supernumerary Teeth on a Material from Excavation and in Living Persons). Szakdolg SZOTE, Szeged.
- Grynaeus T (1996) Isa por... A honfoglalás és Árpád-kori magyarság betegségei és gyógyításuk (Isa por... Diseases and Treatment of the Hungarians of the Conquest Period and of the Árpadian Age). Buda-

- pest, Fekete sas Kiadó 36-45.
- Gyurkó Á (1995) A bácsalmási homokbánya embertani leletanyagának paleodontológiai vizsgálata (Paleodontological Examination of Anthropological Material from the Sandmine of Bácsalmás). Szakdolg JATE, Szeged.
- Hajós I (1989) Alsó kétgyökerű szemfogak gyökereinek morfológiája (Morphology of the Roots of Double Rooted Lower Canines). Szakdolg SZOTE, Szeged.
- Hegyí A, Kocsis SG, Marcsik A (1999) Developmental defects of the mandible in osteoarcheological samples. IVth Int Anthropol Congress Ales Hrdlicka, Prága, Abstr 61.
- Hegyí A, Kocsis SG, Marcsik A (1998) Facial defects in historic skeletal samples. XIIth Eur Meeting Paleopath Assoc, Prága, Abstract 45.
- Henszlmann I (1864) A Székes-Fehérvári ásatások eredményei (Results of excavations at Székesfehérvár). Heckenast G, Pest.
- Hillebrand J (1909) Beiträge zur Morphologie der menschlichen Zähne. Petöfi Ny, Budapest.
- Hillebrand J (1908) Újabb adatok az ember fogainak alakjához (New Data to the Morphology of the teeth of Man). Budapest, Stephaneum.
- Horváth G, Molnár E, Marcsik A (1995) Taurodontism and enamel hypoplasia in a skeletal sample (8th century) from Szarvas, Hungary. Intern Instit for the Study of Man. Proc 9th Intern Symp Dental Morph Firenze, 1992, 379-387.
- Huszár Gy (1976) A fogkopás vizsgálatának újabb módszerei és ezek alapján végzett összehasonlító értékelések eredményei (Further methods of examination of dental attrition and the results of comparative evaluation based on them). Akadémiai Doktori Értekezés tézisei, Budapest.
- Huszár Gy (1974/a) A tejfogak kopása (The Attrition of Deciduous Teeth). Fogorv Szle 67:1-5.
- Huszár Gy (1974/b) Abrasio dentium fiatal korban (Abrasio dentium in juvenile). Anthropol Közl 18:97-103.
- Huszár Gy (1972) Milchgebissabnutzung einst und jetzt. Protectio Vitae 17:213-214.
- Huszár Gy (1969) A lekopott fogak új rendszerű osztályozása (New system classification of abraded teeth). Fogorv Szle 62:293-300.
- Huszár Gy (1968) Karies und Zahnabnutzung. Vitalstoffe-Zivilisationskrankheiten 12:16.
- Huszár Gy (1967) Zahnkrankheiten im Lichte der medizinischen Geographie. Vitalstoffe-Zivilisationskrankheiten 12:10-11.
- Huszár Gy (1966) Medizingeographische Aspekte der Zahnkaries. Geogr Med Hung 0:25-30.
- Huszár Gy (1965a) A magyar fogászat története (A History of Hungarian Dentistry). Budapest, Orvostört Könyvt Kiadv 138, 140.
- Huszár Gy (1965b) Die Konsistenz der Ernährung und Kariesfrequenz. Vitalstoffe-Zivilisationskrankheiten 10:207.
- Huszár Gy (1963) Die spätmittelalterliche Bevölkerung von Fonyód. Paleostomatologie. Anthropol Hung 6:158-162.
- Huszár Gy (1961) Ergebnisse der paleostomatologischen Untersuchungen im Lichte der Ernährungskunde. 7. Int Vitalstoffkonvent, Aachen, Ringbuch 67.
- Huszár Gy (1951) A torus palatinus morfológiája és fogászati jelentősége (Morphology and importance of torus palatinus in dentistry). Fogorv Szle 44:65-71, 108-116.
- Huszár Gy (1945) Az Árpád-kori magyarság fogazata (The Dentition of the Hungarian Population in the Árpadian Age). Máthé Dénes emlékkönyv. Budapest, Atheneum, 77-81.
- Huszár Gy, Schranz D (1954) A foglekopás statisztikai értékelése csontmaradványokon (Statistical Evaluation of Dental Attrition on Skeletal Remains). X. Árkövy Vándorgyűlés, Abstract 5.
- Huszár Gy, Schranz D (1952) A fogszuvasodás elterjedése Dunántúlon az újabb kőkortól az újkorig (Prevalence of dental caries in west Hungary from the neolithic age to modern times). Fogorv Szle 45:171-182, 200-206, 233-243, 272-279.
- Iszlai J (1897) Adalékok a fogak helyzetbeli hibáinak nomenklaturájához és rendszeréhez (Contributions to nomenclature of positional defects and system of teeth). Odontoscóp 5:49.
- Iszlai J (1881a) Fogazati különbségek az emberi nem fő jellegeinél (Dental differences by the general characters of humankind). Orv Hetil 25:18-19, 37-40, 76-78, 97-100, 139-143.
- Iszlai J (1881b) Fogazati különbségek az emberi nem főtípusainál (Dental differences by the general types of humankind). Tud Közl 13:159-165.
- Iszlai J (1880) Ein Blick auf die Beziehungen zwischen der naturgemässen allgemeinen Ernährungsweise und dem Gebisse des Menschen sowie der übrigen Säugetiere.. Pester mediz chirurg Presse.
- Janssens PA (1970) Palaeopathology. Diseases and Injuries of Prehistoric Man. London, The Curwen Press 90-97.
- Jórárt A (1988) Állcsontok méretváltozásai torzított koponyákon (Metric Changes of Facial Bones on Artificially Deformed Skulls). Szakdolg, SZOTE, Szeged.
- Józsa L, Pap I (1989) Indicators of stress in a 9-11th century population. Humanbiol Budapest 19:69-72.
- Kiss Zs (1992) A fogak alakjában fellépő rendellenességeinek vizsgálata avar kori koponyákon (Examination of morphological anomalies of teeth on skulls from the Avar period). Szakdolg SZOTE, Szeged.
- Kiszely I (1969) Sírok, csontok, emberek (Graves, Bones, People). Budapest, Gondolat Kiadó 234-263, 404.
- Kiszely I (1966) A szentendrei longobárd temető embertani vizsgálata (Anthropological examination of a longobard cemetery in Szentendre). Anthropol Közl 10:57-90.
- Kocsis AG (1948) Újabb anatómiai adatok a nervus alveolaris inferior érzéstelenítéséhez (A new anatomical viewpoint of lingual anaesthesia). Orvosok Lapja 4:281-282.
- Kocsis A, Oláh S, Cencetti S (1995) Abnormal dental characteristics in an Etruscan specimen (6th century B.C.). Case report. Intern Instit for the Study of Man. Proc 9th Intern Symp Dental Morph Firenze 1992, 373-378.
- Kocsis SG (-) Az algyői honfoglaláskori temető embertani leleteinek fogászati vizsgálata (Dental examination on anthropological findings of a cemetery at Algyő, originating from the conquest period). Móra Muz Évk, Szeged, in press.
- Kocsis SG (1998) Az ópusztaszeri leletegyüttesből származó állcsonti- és fogmaradványok vizsgálata (The examination of the cheek-bones and the teeth of the findings in Ópusztaszer). In Farkas L Gy, ed., Ópusztaszer-Monostor lelőhely antropológiai leletei (Human skeletal remains found at the Ópusztaszer-Monostor site). Szeged, JATE Embertani Tanszék, AGAPE Kft Ferences Nyomda és Kiadó 155-201.
- Kocsis SG (1994) Ásatási leletekből származó maradandó frontfogak makromorfológiai fejlődési rendellenességeinek jellemzői és azok előfordulási gyakorisága (Macro-morphological developmental anomalies and their prevalence in permanent frontal teeth originating from excavations). Cand diss, Anthropol Közl 36:85-95.
- Kocsis SG (1992) Zahnärztliche Untersuchungen des anthropologischen Materials des in Kunbábony freigelegten Fürstengrabes. In Tóth EH, Horváth A, eds., Kunbábony. Das Grab eines Awarenkhanes. Kecskemét, Barth J 293-295.
- Kocsis SG (1989) Untersuchungen an aus Ausgrabungen stammenden Zähnen und Kiefern in Ungarn (Literaturübersicht). Acta Biol Szeged 35:175-190.
- Kocsis SG (1988) Hódmezővásárhelyi Górsza-Czukur major újkőkori temető embertani anyagának fogantropológiai és patológiai leírása (Dental-anthropological and Pathological Description of the Anthropological Material from the Neolithic Cemetery Górsza-Czukur Ranch in Hódmezővásárhely). Móra Ferenc Muz Évk 1987-1:69-79.
- Kocsis SG, Marcsik A (1996) Idiopathic bone cavities in the mandible: concepts and terminology. In Bodzsár BÉ, Susanne C, eds., Studies in human biol. Eötvös Univ Press, Budapest, 399-403.
- Kocsis SG, Marcsik A (1995) Double-rooted mandibular cuspids in osteoarcheological material. Intern Instit for the Study of Man. Proc 9th Intern Symp Dental Morph Firenze 1992, 381-394.
- Kocsis SG, Marcsik A (1993) The frequency of two developmental anomalies in osteoarcheological samples. Dent Anthropol Newslett 7:11-14.
- Kocsis SG, Marcsik A (1991) Two developmental anomalies of the teeth

- and resulting secondary pathosis. In Ortner DJ, Aufderheide AC, eds., *Human paleopathology: current syntheses and future options*. Washington, Smithsonian Instit Press 273-279.
- Kocsis SG, Marcsik A (1983a) Forms and aetiology of the enamel formations in the cervical zone of teeth. *Paleobios* 1:53-58.
- Kocsis SG, Marcsik A (1983b) Appearance and incidence of coronary dens invaginatus on the basis of studies on recent and paleoanthropological samples. *Acta Biol Szeged* 29:189-197.
- Kocsis SG, Marcsik A (1982) Stellungsanomalien der Zähne an Schädeln aus dem VIII. Jahrhundert. *Humanbiol Budapest* 10:105-110.
- Kocsis SG, Marcsik A (1981) Zománcképződmények a VII-VIII. századból származó koponyák fogain (Enamel formations on the teeth of skulls originating from the 7-8th centuries). *Fogorv Szle* 74:89-93.
- Kocsis SG, Marcsik A (1980) Extradental, paracoronal formations of tooth enamel from the 7-8th centuries. 3th Eur Meeting Paleopath Ass, Caen, France 183-188.
- Kocsis SG, Marcsik A (1979) Avarkori koponyán észlelt rendellenességegyüttes (A complex of abnormalities in a skull from the Avar period). *Anthrop Köz* 23:83-86.
- Kocsis SG, Marcsik A, Mann RW (1992) Idiopathic bone cavity on the posterior buccal surface of the mandible. *Oral Surg Oral Med Oral Pathol* 73:127-130.
- Kocsis SG, Mari A (1988) A palatinális-gingivális barázda (The palatinal-gingival groove). *Fogorv Szle* 81:193-199.
- Kocsis SG, Trogmayer H (1986) A fogak fejlődési rendellenességei Vésztő-Mágorhalom újkőkori és rézkori temető embertani anyagában (Developmental anomalies of teeth in the anthropological material of a cemetery originating from the Neolithic and Copper Ages at Vésztő-Mágorhalom). *Móra ferenc Múz Évk*, 1984/85-1:65-76.
- Kollár L (1948) A zengővárkonyi csiszolt kőkorszakbeli állcsontleletek (Jaw-bone remains dated from the Neolithic Age disinterred at Zengővárkony). *Fogorv Szle* 41:269-276.
- Kordos L (1997) New Records of Hominoid Research at Rudabánya. *Acta Biol Szeged* 42:95-98.
- Kósa F (1993) Directions in dental anthropological research in Hungary, with Historical Retrospect. *Dental Anthropol Newslett* 7/3:1-10.
- Kretzoi M (1975) New Ramapithecines and Pliopithecus from the Lower Pliocene of Rudabánya in north-eastern Hungary. *Nature* 257:578-581.
- Lengyel I (1964) Contribution à l'analyse histologique, serologique et chimique combinée des os et des dents en Archeologie. *Bull Group Int Rech Sc Stomatol* 2:1-25.
- Lenhossék J (1884) Die Ausgrabungen zu Szeged-Öthalom in Ungarn, namentlich die in den dortigen Ur-Magyarischen, Alt-Römischen und Keltischen Gräbern aufgefundenen Skelette, darunter ein Sphenoccephaler und Katarrhiner Hyperchamecephaler Schädel, ferner ein dritter und vierter künstlich verbildeter Macrocephaler Schädel aus Ó-Szőny und Pancsova in Ungarn. Budapest, Királyi Magyar Egyetemi Nyomda.
- Lenhossék J (1882) Szeged-Öthalmi ásátásokról (From excavations at Szeged-Öthalom). Budapest.
- Lenhossék M (1922) Makroskopische Anatomie. In Scheff J ed. *Hand d Zahnheilk*. Wien Leipzig, Urban u Schwarzenberg Bd I. 1-324.
- Lenhossék M (1917) A fogsú pusztítása egykor és most (Destruction of teeth by dental caries in the past and in the present). *Ttud Köz* 49:333-360.
- Lichthammer A (1999) Adatok a honfoglaló magyarok szájpatológiai elemzéséhez (Data to the analysis of oral pathology of Hungarians originating from Conquest period). Szakdolg ELTE Embertani Tan-szék, Budapest.
- Lukomsky JH (1929) Die pathologischen Veränderungen der Zähne im Altertum. *Z f Stomat* 26:727-743.
- Maczel M (1998) Szegvár-Oromdőlő és Szeged-Csongrádi út honfoglaláskori szériák paleosztomatológiai feldolgozása (Paleostomatological treatment of skeletal samples in Szegvár-Oromdőlő and Szeged-Csongrádi street originating from the Conquest period). Szakdolg JATE, Szeged.
- Maczel M, Kocsis SG, Marcsik A, Molnár E (1997) Dental disease in the Hungarian conquest period. *Bull Mém Soc Anthropol Paris* 9:457-470.
- Magitot E (1896) L'usure des dents chez l'Homme dans les races préhistoriques et dans les races actuelles. *Rev de Stomat* 3:33.
- Malán M (1955) Zahnkeim aus der zweiten Aurignacien Schicht der Höhle von Istállóskő. *Acta Arch Hung* 5:145-148.
- Malán M (1941) X. századbeli magyarok csontmaradványainak embertani vizsgálata (Anthropological studies on the skeletal remains of Hungarians living in the 10th century). *Folia Arch III-IV*. Magyar Tört Muz, Budapest, Egyházmegyei Nyomda, Veszprém.
- Malán M (1929) Adatok a lengyeli őstelep neolitikus lakóinak anthropológiájához (Data on the anthropology of the inhabitants of the primary settlement dated from the Neolithic Age discovered at Lengyel). Thesis, Budapest.
- Marcsik A (1983) A Duna-Tisza köze avar korának paleopatológiája (Paleopathology of the Avar Age at the Territory between the Danube and the Tisza). Cand diss, Szeged.
- Marcsik A (1976) Izsák Balázspusztá honfoglaláskori leletének embertani jellemzése (The anthropological description of the skeleton from the period of the Hungarian conquest found at Izsák-Balázspusztá). *Cumania IV*. *Archaeologica* 185-190.
- Marcsik A, Iregren E, Kocsis SG (1997) Dental disorders in a Medieval skeletal sample. 10th Congr Eur Anthropol Ass, Brüssel, Belgium, Abstract 199.
- Marcsik A, Kocsis SG (1996) Rendellenesség- és betegség komplexumok osteoarcheológiai leleteken (Developmental anomalies and disease-complexes in osteoarcheological samples). *Fogszabályozás és Embertan Kongr (Orthodontics and Anthropology)* Szeged, Abstract 21.
- Marcsik A, Kocsis SG (1995) Facial defects in historic skeletal samples. In: *Perspectives in anthropology of past and present populations*. Winkler's Memorial Symp Xanthi, Greece, Abstract 53.
- Marcsik A, Kocsis SG (1992) Occurrence of Enamel Hypoplasia in Prehistoric and Historic Skeletal Samples (Hungary). In Goodman AH, Capasso LL eds., *Recent contributions to the Study of Enamel Developmental Defects*. *J Paleopathol Monogr Publ* 2:219-229.
- Marcsik A, Kocsis SG (1985) A Stafne-féle idiopathiás állcsontüreg gyakorisága paleoantropológiai leleteken (Incidence of the Stafne-type idiopathic mandible cavity in paleoanthropological records). *Fogorv Szle* 78:207-210.
- Marcsik A, Kocsis SG (1984) Kettős gyökerű alsó caninus gyakoriságáról és filogenetikai előzményeiről (Frequency of the double rooted lower caninus and its phylogenetic background). *Anthrop Köz* 28:97-106.
- Marcsik A, Kósa F, Kocsis SG (1992) The possibility of age determination on the basis of dental transparency in historical anthropology. In Smith P, Tchernov E, eds., *Structure, function and evolution of teeth*. Freund Publ House Ltd, London 527-538.
- Máthé D, Molnár L (1940) Artikuláció a természetes fogazatban, különös tekintettel a lerágott fogazatra (Articulation in the natural dentition with a special regard to the abraded dentition). *Fogorv Szle* 33:1-10, 37-47.
- Mátyás A (1996) Caries és következményes betegségek vizsgálata a kiszombori gepida temető embertani anyagában (Examination of caries and resulting diseases on anthropological material of a cemetery in Kiszombor originating from the Hun (gepide) period). Szakdolg JATE, Szeged.
- Molnár E, Horváth G (1995) Developmental anomalies of the teeth in historic skeletal samples. In Radlanski RJ, Renz H, eds., *Proc 10th Int Symp Dental Morphol*, Berlin, "M" CM Brünne Gbr 377-385.
- Molnár E, Kocsis SG, Maczel M (1998) Entwicklungsanomalien der Zähne bei Skeletresten aus der ungarischen Avarzeit von Pitvaros. *HOMO* 49/Suppl S68.
- Molnár L (1939) Abkautungserscheinungen an natürlichen Zähnen und ihre Nutzbarmachung für die Formgestaltung künstlicher Zähne. *Z Stomatol* 37:124-133, 191-201, 255-268.
- Molnár L, Huszár Gy (1953) A nemi különbség jelentősége a stomatológiában (Importance of the sexual dimorphism in stomatology). *Fogorv Szle* 46:133-141.
- Mummery JR (1874) Caries in ancient skulls. *Br J Dent* 17:157.

- Mummary JR (1870) The relation of dental caries in the ancient inhabitants of Great Britain and Aboriginal races to food and social conditions. *Tr Odont Soc Great Britain* 2:7.
- Nemeskéri J (1951) Alsónémediben feltárt csontvázleletek (bádeni csoport) embertani vizsgálata (Anthropological examinations of the skeletal remains disinterred at Alsónémedi). *MTA Társadalomtört Tud Közl* 1:63-89.
- Nemeskéri J (1943) A győri avar temető koponyáinak vizsgálata (Investigations on the skulls of Avarian Age discovered at Győr). In Pettich N, Nemeskéri J, eds., *Győr története a népvándorlás korában (History of Győr in the migration period)*. Győr.
- Nemeskéri J, Harsányi L (1968) A hamvasztott csontvázleletek vizsgálatának kérdései (Questions of examination of the cremated skeletal remains). *Anthrop Közl* 12:99-116.
- Négyessiné Gonda K (1993) Sopronkőhida IX. századi temetőjének embertani feldolgozása (Anthropological treatment of the 9th century cemetery at Sopronkőhida). Szakdolg ELTE Embertani Tanszék, Budapest.
- Nyári J (1873) A pilini Leshegyen talált csontvázokról (Skeletal remains disinterred at Leshegy, Pili). *Archeol Közl* 9:16.
- Pap I, Török K, Szikossy I, Bernert Zs, Józsa L (1999) Microscopic Analysis of Dental Calculus from 18th-19th Centuries Mummies, Vác, Hungary. IVth Intern Anthropol Congr of Ales Hrdlicka, Prága, Abstr 113-114.
- Pap I, Tillier AM, Arensburg B, Weiner S, Chech M (1995) First scanning electron microscope analysis of dental calculus from European Neanderthals: Subalyuk (Middle Paleolithic, Hungary). *Bull Mém Soc Anthropol* 7:69-72.
- Pap I (1986) Oral pathology and social stratification in the Hungarian Middle Ages. *Ann hist nat Mus Nat Hung* 78:339-345.
- Patrick JJR (1889) The study of prehistoric remains in their relation to dentistry. *Dental Cosmos* 31:187.
- Pedersen PO (1949) The East Greenland Eskimo Dentition. Numerical Variation and Anatomy. Kobenhavn, CA Reitzels Forlag, Bianco Lunos Bogtrykkeri.
- Pelsőczy KI (1993) Fogazat és filogenezis, Primates ordo (Dentition and phylogenesis, Primates ordo). Szakdolg SZOTE, Szeged.
- Ponyi Sjr, Ponyi S (1989a) Osteométer alsó állcsontpótlások tervezéséhez (Osteometer for planning mandible prostheses). *Fogorv Szle* 82:113-114.
- Ponyi S, Szabó Gy (1989b) Állkapocsfejecsk pótlások tervezése embertani leletekről felvett adatok alapján (Designing jaw capitulum prostheses based on the data taken from anthropological finds). *Fogorv Szle* 82:369-374.
- Ponyi S, Szabó Gy, Divinyi T (1989c) Állcsontgerinc ívek alveoláris görbülete és hossz értékelése több száz éves koponya mintákon (Evaluation of alveolar curvature and length of the jaw bone ridge on several hundred-years-old skulls). *Fogorv Szle* 82:375-380.
- Ponyi S, Szabó Gy (1991a) A mandibula corpus néhány átlag mérete állkapocspótlások tervezéséhez (Several mean measures of the mandible corpus for designing jaw replacements). *Fogorv Szle* 84:23-27.
- Ponyi S, Szabó Gy, Nyilasi J (1991b) Az állkapocs néhány jobb és bal oldali méretének összehasonlító vizsgálata (Comparative examination of some right and left measures of the mandible). *Fogorv Szle* 84:105-110.
- Ponyi S, Szabó Gy, Divinyi T (1991c) A fogmedernyűlványok frontfelszíneinek dőlésszöge a második metszőfogak és az első alsó premolárisok tengelyében (Angular offset of the front surfaces of tooth bed extensions in the axis of the second incisors and the first lower premolars). *Fogorv Szle* 84:199-203.
- Pór L (1953) A fogazat újabb térfogatmérési eredményeiről és funkcióértékeléséről (On the new results of the volumetry on dentition and their functional evaluation). *Fogorv Szle* 46:41-48.
- Pór L (1948) A fogak térfogatmérésének jelentősége (Importance of volumetry of the teeth). *Fogorv Szle* 41:235-238.
- Prágai G, Fazekas A (1982) Az állkapocsgerinc magasságának vizsgálata a moláris fogak tájékán, antropológiai leletekből származó mandibulákon (Studying the Altitude of the Jaw-Bone around the Molar Teeth on Mandibles of Anthropological Finds). *Fogorv Szle* 75:231-235.
- Radnai PA (1943) Ritka fogzási rendellenességek két esete (Two cases of rare dentitions anomaly). *Fogorv Szle* 36:62-65.
- Regöly-Mérei Gy (1970) Paleopathological examination of skeletal finds in the Roman period and description of diseases in Greek and Roman medical texts. *Comm de Hist Artis Med* 71:55-67.
- Regöly-Mérei Gy (1962) Palaeopathologia II. Az ősemberi és későbbi emberi maradványok rendszeres kórbonctana (Palaeopathology II. Systematic pathology of primeval men and of later human remains). Budapest, Medicina 113-135.
- Regöly-Mérei Gy, Nemeskéri J (1958) Palaeopathologische Untersuchungen an ägyptischen Mumien aus der Römerzeit. *Virchows Archiv* 331:569.
- Rudas G (1899a) Tanulmány a fogak és csontok korhadásáról (Study on the decay of teeth and bones). *Magyar Fog Szle*, 3:179-186, 229-234, 262-266.
- Rudas G (1899b) A csont- és fogszövetben halál után létrejött némi elváltozásról (From some postmortal alterations in the bone- and tooth tissue). *Magyar Fog Szle*, 3:341-345.
- Salamon H (1942a) A magyar stomatologia (fogászat) története (History of the Hungarian stomatology (dentistry)). Budapest, Magyar Stomatológiai Társaság Kiadóhivatala, 155, 159-161.
- Salamon H (1942b) Mátyás király koponyájának azonosítási lehetősége (Identification-possibility of King Mátyás's skull). *Fogorv Szle*, 35:261-274.
- Salamon H (1941) II. Lajos magyar király tetemének felismerése (Recognition of Lajos II. Hungarian King's mortal remains). *Fogorvosok Lapja*, 3:22-28.
- Salamon H (1940/a) II. Rákóczi Ferenc feleségének halála (Death of Ferenc Rákóczi's wife). *Fogorv Szle*, 33:387-297.
- Salamon H (1940/b) Petőfi aranyfoga (Petőfi's gold tooth). *Fogorv Szle*, 33:65-74, 129-133.
- Salamon H (1940/c) Alvinczy tábornagy vendégfogai (Fieldmarshal Alvinczy's false teeth). *Fogorvosok Lapja*, 2:409-414.
- Salamon H (1938) Liszt Ferenc fogai (Ferenc Liszt's teeth). *Fogorv Szle*, 31:97-114.
- Salamon H (1923) Petőfi koponyája és rendellenes fogazatának meghatározása (Petőfi's skull and the diagnosis of his irregular dentition). *Fogorv Szle*, 16:3-56.
- Schranz D (1994) A stomatologia két határterülete: az igazságügyi fogorvosstan és az orális genetika (Two borderlands of stomatology: the forensic dentistry and the oral genetics). *Fogorv Szle*, 87:285-288.
- Schranz D (1991) Genetik der Zahn-, Mund- und Kieferregion. Budapest, Akadémiai Kiadó.
- Schranz D (1988) III. Béla csontmaradványainak vizsgálata fogászati szempontból (Examination of the bone remainders of Béla III from a dental point of view). *Fogorv Szle*, 81:103-109.
- Schranz D (1987) Az igazságügyi fogorvosstan a két világháború között Magyarországon (The dental jurisprudence in Hungary between the two world wars). *Fogorv Szle*, 80:267-271.
- Schranz D (1967) Abnutzung des Gebisses des fossilen und rezenten Menschen und die Bedeutung des Kauens in der stomatologischen Prophylaxe. *Acta Med Hung*, 24:89-92.
- Schranz D (1962) Zahnbetterkrankungen der längsvergangenen Zeit. *Z Morph Anthropol*, 52:347-354.
- Schranz D (1953) A személyazonosság megállapítása a fogászati lelet alapján (The identification of identity on the basis of the dental findings). *Fogorv Szle*, 46:225-231.
- Schranz D (1944) Törvényszéki stomatologia (Forensic stomatology). Budapest.
- Schranz D, Huszár Gy (1958) Die Kinderzahnkaries der Vergangenheit in Ungarn. *Öst Z Stomat*, 55:587-594.
- Schranz D, Huszár Gy (1955) Die Paleopathologie des prähistorischen Menschen in Ungarn. *Öst Z Stomatol*, 52:247-258.
- Schranz D, Huszár Gy (1954) Az őskori ember fogbetegségei (Dental diseases of the primeval man). *Fogorv Szle*, 47:218-226.

- Schulze C (1970) Developmental abnormalities of the teeth and jaws. In Gorlin FR, Goldman HM eds., *Thoma's Oral Pathology*. St Louis, CV Mosby, 96-183.
- Schwerz F (1916) Morphologische Untersuchungen an Zähnen von Alamannen aus dem V- bis X. Jahrhundert. *Arch Anthropol*, 15:1-43.
- Schwerz F (1914) Über Zähne frühhistorischer Völker der Schweiz. *Schweiz Vierteljahrs Zahnheilk* 24:135-185.
- Scott DC (1958) Absence of Upper Central Incisor. *Br Dent J*, 104:247-248.
- Seger S (1955) Defectbildungen an der Zahnleiste und an den Extremitäten. *Med Diss*, Berlin.
- Simon B, Kőműves O (1937) Az állkapocs felhágó ágának mérete és helyzeti variációi (Dimensional and positional variations of the ramus mandibulae). *Fogorv Szle*, 30:49-76.
- Somogyi B (1953) Az állkapocs félfoldali fejlődési rendellenességei, változatai és részaránytalanságai sebész-anatómiai szempontból (Unilateral developmental abnormalities, variations and disproportions of the mandibles in a surgical anatomical viewpoint). *Fogorv Szle*, 46:193-199.
- Szabó J (1935) L'Homme moustérien de la grotte Mussolini (Hongrie). Étude de la mandibule. *Bull Mém Soc Anthropol Paris*, 6:23-30.
- Szabó J (1934) Skeletal remains of early man in cave named "Subalyuk". *J Dent Res*, 14:204.
- Szarvas É (1981) Foganomáliák és fogmegbetegedések Szeged környéki avarkori koponyákon (Dental anomalies and dental diseases on skulls from the Avar period found around Szeged). *Szkdolg JATE*, Szeged.
- Szentpétery A, Kocsis SG, Marcsik A (1990) The Problem of the Bifid Mandibular Condyle. *J Oral Maxillofac Surg*, 48:1254-1257.
- Szikossy I (1999) Studies on oral pathology in the cemetery of Vörs-Papkert B, Western Hungary. *Annl hist nat Muz Natn Hung*, 91:219-230.
- Szikossy I (1993) Szájpatológiai vizsgálatok a Vörs-Papkert B temető népességén (Oral pathological examinations on population of cemetery at Vörs-Papkert B). *Szkdolg ELTE Embertani Tanszék*, Budapest.
- Szikossy I, Bernert Zs (1996) A Kereki-Homokbánya temető paleostomatológiai vizsgálata (Paleostomatological examination in the cemetery Kereki-Homokbánya). In Pálfi Gy, Farkas LGY, Molnár E, eds., *Honfoglaló magyarság Árpád-kori magyarság*. Szeged, JATE Embertani tanszéke, AGAPÉ Ferences Nyomda és Kiadó, 189-198.
- Szikossy I, Tari Cs, Bernert Zs, Pap I (1999) Oral Pathological Investigation of 18th-19th Centuries Mummies, Hungary. *Ivth Int Anthropol Congr of Ales Hrdlicka, Praha*, Abstr 118-119.
- Szokol D (1996) Honfoglalás előtti hazai koponyaleletek fogászati értékelése (Dental evaluation of home skull findings originating from the periode before the Conquest). *Szkdolg SOTE Fogorv Kar*, Budapest.
- Szokolóczy-Syllaba B (1953) Mérési adatok a lingula szintjének meghatározásához (Survey data to determination of the level of the lingula). *Fogorv Szle*, 46:177-180.
- Szokolóczy-Syllaba B (1937) Mérések az állkapocs felhágó szárán különös tekintettel a vezetési érzéstelenítésre (Measurements of the Ascending Ramus of the Mandible). *Fogorv Szle*, 30:439-449.
- Tamás F (1986) A canalis mandibulae helyzetének röntgenvizsgálata száraz csontanyagon (X-Ray examination of the position of the canalis mandibulae on dry osteine). *Fogorv Szle*, 79:304-308.
- Tari Cs (1999) A váci XVIII-XIX. századi múmiák szájpatológiai jellegeinek vizsgálata (Examination of oral pathological characteristics of the mummies originating from 18th-19th centuries at Vác). *Szkdolg ELTE Embertani Tanszék*, Budapest.
- Tasnádi-Kubacska A (1967) *Rudapithecus hungaricus* - a rudabányai ősmajom (Rudapithecus hungaricus - the primeval ape at Rudabánya). *Élet és Tudomány*, 22:2083-2085.
- Tasnádi-Kubacska A (1960) *Palaeopathologia I. Az ősszállatok pathológiája (Palaeopathology I. Pathology of fossil animals)*. Budapest, Medicina.
- Terra Mde (1905) *Beiträge zu einer Odontographie der Menschenrassen*. Frankfurt a O.
- Thoma A (1967) Human teeth from the Lower Palaeolithic of Hungary. *Z Morph Anthropol*, 58:152-180.
- Thoma A (1963) The dentition of the Subalyuk Neandertal child. *Z Morph Anthropol*, 54:127-150.
- Tóth K (1970) The Epidemiology of Dental Caries in Hungary. Budapest, Akadémiai Kiadó, 13-72, 250-277.
- Tóth K (1968) Megjegyzések Lenhossék M. "A fogszerű egykor és most" c. közleményéhez (Comments on Lenhossék's work "Dental Caries in the Past and in the Present"). *Fogorv Szle*, 61:81-85.
- Tóth K (1966) A processus alveolaris állapota az avar- és Árpád-kori koponyák vizsgálatára alapsítva (Condition of the processus alveolaris on the basis of the examination of skulls from the Avar- and Árpádian Ages). *Fogorv Szle* 59:1-11.
- Tóth K, Sonkodi I (1972) Tápé lelőhelyről származó bronzkori koponyák fogászati állapota (Dental condition of the skulls from the Bronze Age at Tápé site). *Fogorv Szle*, 65:257-264.
- Török A (1893) Jelentés III-ik Béla magyar király és neje testerekléiről (Report from Béla III. Hungarian King's and his wife's body relics). *Értekezések a Ttud köréből*, 23:94-139.
- Török K, Pap I, Józsa L (1999) 18-19. századi múmiák fogköveinek mikroszkópos vizsgálata (Microscopic studies on the dental calculus of the mummies from the 18th-19th centuries). *Fogorv Szle*, 92:317-327.
- Török K (1998a) 18-19. századi múmiák fogköveinek mikroszkópos vizsgálata (Microscopic studies on the dental calculus of the mummies from the 18th-19th centuries). *Szkdolg SOTE Fogorvostud Kar*, Budapest.
- Török K, Pap I, Józsa L (1998b) 18-19. századi múmiák fogköveinek mikroszkópos vizsgálata (Microscopic studies on the dental calculus of the mummies from the 18th-19th centuries). *Anthropol Közl*, 39:71-80.
- Török Z (1993) Fogazati és filogenezis, emberszármazástani leletek (Dentition and phylogenesis, genealogical findings). *Szkdolgozat SZOTE*, Szeged.
- Ungváry E (1998) Kecskemét Gerő major X-XI. századi temető leletanyagának paleodontológiai vizsgálata (Paleodontological examination of the findings of a cemetery from the 10th-11th century at Kecskemét Gerő major). *Szkdolg JATE*, Szeged.
- Visser JB (1948) *Beitrag zur Kenntnis der menschlichen Zahnwurzelformen*. Inaug Diss Zürich, Hilversum, Rottling.
- Weidenreich F (1937) The Dentition of Sinanthropus Pekinensis. A Comparative Odontography of the Hominids. *Palaeontologica Sinica*, New Ser D 1, Peiping.