Institute of Forensic Medicine, Mykolas Romeris University
Faculty of Medicine, Vilnius University

**Baltic Bioarchaeology Meeting**

“Bioarchaeology and Forensic Anthropology”

**Supported by:**

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**Vilnius, August 24-25, 2009**
Meeting venue:
Institute of Forensic Medicine, Mykolas Romeris University, Didlaukio g. 86E, LT - 08303
Vilnius

Organisers:
Institute of Forensic Medicine, Mykolas Romeris University
Department of Anatomy, Histology and Anthropology, Faculty of Medicine, Vilnius University

Supported by:
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Department of Cultural Heritage under the Ministry of Culture

Organising Committee:
Assoc. prof. dr. Alvydas Pauliukevičius, Director, Institute of Forensic Medicine, Mykolas Romeris University
Dr. Marija Čaplinskienė, Vice-director for Research and Development, Institute of Forensic Medicine, Mykolas Romeris University
Assoc. prof. dr. Rūta Damijonaitienė, Head of the Research and Development Department, Institute of Forensic Medicine, Mykolas Romeris University
Prof. dr. Rimantas Jankauskas, Senior researcher, Institute of Forensic Medicine; Professor, Vilnius University
Danuta Sobieska, Head of Finance Department, Institute of Forensic Medicine, Mykolas Romeris University
PROGRAMME

Sunday, August 23

Arrival, accommodation.
19.00: Informal get-together

Monday, August 24

8.00-10.00    Registration
10.00-11.00   Opening, session I: Forensic anthropology.
Chair: A. Pauliukevičius, R. Jankauskas

J.L. Thomsen. Forensic anthropology from the perspective of forensic pathology
H.C. Petersen, P. Courtaud, A-M. Tillier. Personal identification in the Mesolithic – sex determination of a case from Denmark
L.M. Olesen. Craniofacial robusticity within two groups of Mediaeval skeletons from Denmark

11.00-11.30   Coffee Break

11.30-13.00   Session II: Forensic anthropology and archaeology.
Chair: J.L. Boldsen

A. Wessman. Huhtiniemi in Lappeenranta, Finland: a forensic case that became archaeology
G. Gerhards. Bioarchaeology and forensic anthropology of Riga St. Gertrude cemetery mass graves
L. Kurila. Osteological sexing of cremated human remains: an accuracy test based on gender-related grave goods
J. Limbo. Fragmented commingled human bones of migration period (450-600 AD) mortuary house at Lepna Saarema (Ösel island), Estonia: possible use of teeth
R. Sitiené, R. Jankauskas. Forensic medical investigation of skeletons from Tuskulėnai mass graves, Vilnius

R. Jankauskas, R. Sitiené. Weapon-induced traumas in Plinkaigalis Iron Age burial ground

13.00-14.00   Lunch

14.00-16.30   Session III: Chemical analyses of skeletal tissues.
Chair: M. Jakubieniené

H. Glab, M. Kepe. Reconstruction of paleodiet of an early Mediaeval population from Trepcza (Southern Poland) as a determinant of biological conditions
V. Rudovica, A. Viksna, J. Katkevichs, G. Zarina. Application of icp–ms for the investigation of elemental distribution in archaeological bones
P. Dąbrowski, D. Nowakowski. Ultrastructural image and chemical composition of hard tissues of permanent teeth affected by caries in Mediaeval skeletal series from Gorzów Wlkp, Poland
P. Tarp. Lead in bones in a high society Iron Age population

M. Jakubieniené, G. Kisielius. A multi-elemental study of long bone diagenesis in Napoleon soldier’s skeletal remains

G. Kisielius, M. Jakubieniené. Possibilities for inhumation time determination during skull vault analysis

16.30   Visit to The Museum of Genocide Victims and Tuskulėnai memorial. Conference Dinner
Tuesday, August 25

10.00-11.00  **Session IV: DNA analyses of skeletal tissues.**
Chair: M. Ėaplinskienė

**A. Pilecka, R. Jankauskas, A. Jonkisz, A. Lebiota, J. Jankauskienė, T. Dobosz.** DNA identification of Radvilos (Radziwill) family remains by mtDNA and Y-chromosome analysis

**A. Pauliukevičius, M. Ėaplinskienė, J. Jankauskienė, D. Bunokienė, J. Kukienė, K. Savanevskytė.** An approach to investigation of degraded genetic material

**S.R. Borovko, A.A. Maksimau, V.V. Korban, A.V. Belanovich.** DNA examination of skeletal remains: Belarus experience

11.00-11.30  **Coffee Break**

11.30-13.00  **Session IV: Palaeopathology.**
Chair: H.C. Petersen

**U.H. Freund, J.L. Boldsen.** The association between possibly autoimmune changes to the iliac auricular surface and chronic infectious diseases

**L.V. Jørgensen.** Tuberculosis in Mediaeval Denmark

**D. Pedersen.** The palaeopathology of the newly defined bone condition ‘FOS’

**S. Schwarz.** Treponemal lesions in a skeletal sample from Early Mediaeval Denmark (1100-1350 AD)

**Ž. Miliauskienė.** Dental status of individuals buried in and around Trakai church

**K. Salo.** Palaeopathology of two Finnish Mediaeval to Post-Mediaeval cemeteries

13.00 14.00  **Lunch**

14.00-15.00  **Session V: Population studies.**
Chair: A. Wessman

**J.L. Boldsen.** The demography of disease in antiquity – disentangling the effect of latency period and the disease-related risk of dying

**G. Zariņa.** Palaeodemography of Bronze Age population of Kivutkalns, Latvia

**S. Weise.** Malmö St Jörgen – analysing mortality patterns in Mediaeval times

**H.A. Madsen.** Stature estimation – a comparative study of Danish populations, 1050-1700 AD

15.00-15.30  **Coffee Break**

15.30-16.30  **Session V: Population studies.**
Chair: G. Gerhards

**M. Dąbrowska, M. Kępka, L. Kryst.** estimation of life conditions of Copper Age group from Urziceni-Vama (Romania) in the aspect of the body build reconstruction

**R. Allmäe.** Human bones in Salme boat, Saaremaa island

**B. Kwiatkowska, J. Szczurowski.** Inhabitants of Mediaeval Wrocław (Poland)

**T.S. Nielsen.** Site report: The incidentally found Mediaeval cemetery by the fortress Gammel Brattingborg, Samsø, Denmark

16.30 – **Closing of the meeting; sight-seeing of the Old University**
19.00 – **Farewell dinner**

**Wednesday, August 26**

10.00 – **Excursion to Kernavė and Trakai (optional)**
ABSTRACTS
HUMAN BONES IN SALME BOAT, SAAREMAA ISLAND

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In autumn 2008 during construction works and following archaeological rescue excavations in Salme village, Saaremaa island, ancient boat remains with animal and human bones were discovered. The human bones inside the boat contour dated to Vendel/ Pre-Viking period. Most of the skeletons were commingled due to the erstwhile works concerning road construction and wiring. Only some parts of skeletons were intact. Preliminary analysis of human bones indicated remains of seven men inside the boat. The number of skeletons in boat is exceptional in the background of known ship- and boat-burials in Northern Europe.
THE DEMOGRAPHY OF DISEASE IN ANTIQUITY – DISENTANGLING THE EFFECT OF LATENCY PERIOD AND THE DISEASE RELATED RISK OF DYING

J.L. Boldsen

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Increased risk of dying – however small – is associated with virtually all human diseases and death as such is nearly a consequence of disease. In osteology, it is only possible to diagnose diseases that affect the individual for some length of time as more quickly developing diseases will lead to recovery or death before specific bone lesions can develop.

As disease is associated with an increased risk of dying it would be natural to assume that people who suffered from osteologically recognizable disease conditions would on average die in younger ages than people who did not suffer from that particular condition. However, a phase of variable duration precedes the development of recognizable osteological changes. During this latency period people with the disease will in fact be at risk of dying of the disease but without the diagnostic lesion. This means that the distribution of age at death of people with lesions becomes a convolution of a waiting time to lesion distribution and an (increased) risk of dying distribution.

Modern age estimation based on the principals of Calibrated Expert Inference (CEI) makes it possible to reconstruct the distribution of age at death for individuals with and without specific lesions. However, even with this tool it is very difficult to de-convolute the two types of distributions. In general, if there is an appreciable waiting time before lesions develop and distribution (can be determined by the biology of the condition) of age at death is more or less the same for affected and unaffected individuals, it can be concluded that the condition is associated with a significant excess risk of dying.

The methods and problems of this approach to the understanding disease dynamics in the past is illustrated by examples of joint disease in the Tirup skeletal sample.
DNA EXAMINATION OF SKELETAL REMAINS: BELARUS EXPERIENCE

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Bones of about 150 unknown bodies are found in the Republic of Belarus annually. Almost all of them are studied in DNA laboratory of State Medical Forensic Service (SMFS). Ministry of Internal Affairs of our Republic began to create national DNA database in 2006. Thus Ministry of Internal Affairs organized computer database and started to analyze reference samples including relatives of missing people. Task of SMFS was established as the dead body investigation. The decision of genotyping of all unknown bodies found in Republic since 1997 was made in 2007. So more than 600 bodies were exhumed in one year and brought to SMFS laboratory.

DNA extraction was fulfilled with phenol-chloroform method after bone powder decalcification. Purification of the extracts was performed with Amicon Ultra devices (Millipore) followed by QIAquick PCR Purification Kit (Qiagen). Nuclear DNA analyses were performed with AmpFISTR Identifiler and Minifiler Kits, Y-chromosome with Y-filer Kit, mitochondrial DNA – with BigDye Terminator v.3.1 Kit from Applied Biosystems on ABI Prizm 3100 Genetic Analyzer.

As a result,

1. Strategy of examination beginning from selection of appropriate bone material and finishing with analysis of nuclear, Y-chromosome and mitochondrial DNA was elaborated.

2. Method of DNA isolation from bone material was created as well, what helped us to raise success rate of DNA analysis up to 95%.

3. Several cases of incorrect identification were registered after direct comparison of bones’ genotypes to dataset of relatives of missing people. Additional examinations of Y-chromosome, mitochondrial DNA or samples of other relatives were performed, what allowed to prove or exclude relationship and identify unknown body.
ESTIMATION OF LIFE CONDITIONS OF COPPER AGE GROUP FROM URZICENI-VAMA (ROMANIA) IN THE ASPECT OF THE BODY BUILD RECONSTRUCTION

M. Dąbrowska, M. Kępa, L. Kryst

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The Urziceni-Vama site is situated in the Urziceni Village, next to Romanian and Hungarian border. Graves uncovered during excavations belong to the Middle Copper Age Bodrogkeresztur culture (according to the Hungarian chronological classification) dated in between 4000 and 3500 BC. The sample contains skeletal remains of 50 individuals fragmentary preserved. The deceased were laid down according to their sex in a contracted position on their left (women) or right (men) side. The burials were oriented west-east.

Purpose of the report is to estimate the life conditions of the individuals on the basis of sexual dimorphism in the aspect of body build reconstruction by using body proportion ratios, massiveness ratios and body height, as well as on the basis of pathological changes.
ULTRA STRUCTURAL IMAGE AND CHEMICAL COMPOSITION OF HARD TISSUES OF PERMANENT TEETH AFFECTED BY CARIES IN A MEDIEVAL SKELETAL SERIES FROM GORZÓW WLKP, POLAND

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One of the problems in paleoanthropology research in the area of status of the chewing organ is suitable assessment of changes in the caries. In previously reported and tested anthropological systems for the caries, tooth surfaces is mainly those that can be evaluated morphological. However, due to the nature of change, the initial dental caries in macroscopic studies usually are not detected. Therefore, full characterization of the initial changes in the course of dental caries requires the use of scanning electron microscope.

The aim of this work is to evaluate the structural and chemical differences, using techniques of SEM and chemical analysis (EDS), and to differentiate between healthy and affected by changes in dental caries of permanent teeth hard tissues of theburghers of medieval population. The analysis used the product of the medieval cemetery from Gorzów Wlkp. Inhumated men and women characterized by high variability of the body typical of the urban population in medieval Poland, on average, with a good socio-economic status. Processes of dental caries were frequent (67%) and were severe in nature. The state of dentition of 91 individuals been analyzed macroscopically. The total amount of 5 selected teeth has been the object of the SEM and EDS analysis. Macroscopic evaluation of the surface of the teeth has been isolated in a white artificial light. Then all teeth have been sawed and histological experience has been done. SEM and chemical analysis have been performed on the selected outbreaks of caries. The chemical analysis included: Ca, Mg, P, Na and Cl. The result of this study was to register changes in the initial stage of dental caries through the stage of superficial deep loss. Changes in dental caries have been identified on many surfaces of teeth. SEM analysis of the chemical composition gave a statement for the initial states of caries in the areas which were macroscopically considered healthy.

In conclusion, the results of SEM and chemical analysis may be a valuable source of information about the early changes in the dental caries at both individual as well as populations.
THE ASSOCIATION BETWEEN POSSIBLY AUTOIMMUNE CHANGES TO THE ILIAC AURICULAR SURFACE AND CHRONIC INFECTIOUS DISEASES

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The sub-condral part of the iliac auricular face is particularly susceptible for autoimmune inflammatory processes. Autoimmune reactions can be triggered both by internal and external (infectious) causes. This study seeks to recover information about possible infectious causes for possible autoimmune changes in the iliac auricular surface.

The study is designed as a case-control study nested in a cross sectional study of the prevalence of possible autoimmune changes in the iliac auricular surface. Two well characterized medieval Danish skeletal samples are examined and positive and negative signs of possible autoimmune changes in the iliac auricular surface are recorded in a data base.

From this data base two study samples are defined. The two samples are characterized by having positive (cases) or negative (controls) signs of possible autoimmune changes in the iliac auricular surface. The members of the control sample are matched to the members of the case sample for site, age and sex. Signs of chronic infectious diseases, leprosy, Treponema disease, tuberculosis and FOS are recorded in the two study samples. Possible associations between possible autoimmune changes in the iliac auricular surface and these infectious conditions are described by odds ratios.
In August–October 2006, archaeological excavation was undertaken on the site at No. 42/44 Brivibas street in Riga, Latvia. This area lies outside the city walls, at the location where St Gertrude’s Church stood in the 16th–17th centuries, together with its extensive churchyard. 200 m$^2$ of the cemetery was excavated, uncovering a total of 722 individual burials, 283 of them in two mass graves. In both mass graves, the great majority of skeletons were anatomically undisturbed, clearly indicating that they had been buried in a fairly short space of time, or even on a single occasion.

Following determination of age and sex, palaeopathological examinations were carried out using macroscopic observations. Palaeodemographical indices show even sex ratio both for the whole cemetery and for mass graves, excluding the possibility that mass graves might contain soldiers, killed in battle. Comparison of age structure of cemetery and mass graves indicates substantially bigger proportion of infant burials in the cemetery (not mass) burials. In addition, 46.8 % of mass grave burials are of age 15-35, compared to 27.6% in the cemetery. Proportion of older individuals (aged 40-70) is similar both in cemetery and common graves. In general, age distribution of mass graves with high contents of adolescents and young adults is close to catastrophic death assemblage, whereas cemetery burials resemble ordinary mortality distribution with high contents of children and old people.

Palaeopathological investigation shows that 30% of males in the mass graves had skeletal traumas or wounds. However, for individuals in mass graves there are no cases, where these traumas might be the cause of death. There are many cases of periostitis, possibly caused by infections, metabolic disturbances, and inadequate nutrition.

The general lack of pathology and trauma among the mass grave skeletons, combined with demography, archaeological context and historical sources, suggests that in both mass scales burial found around the St. Gertrude Church there could be buried either years 1601 -1602 victims of starvation and plague epidemic from Outer Riga and Vidzeme country district or year 1623 plague epidemic victims.
RECONSTRUCTION OF THE PALEODIET OF AN EARLY MEDIEVAL POPULATION FROM TREPCZA (SOUTHERN POLAND) AS A DETERMINANT OF BIOLOGICAL CONDITIONS

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Studies into the reconstruction of paleodiet are a very important element of diagnosing the social, economic and biological status of historical populations. They are carried out on the basis of an analysis of concentrations of micro- and macroelements in human teeth and bones. The elements which give a wealth of information about the biological conditions of populations are strontium, barium, zinc and calcium. Additionally, of particular significance are the Sr/Ca, Sr/Zn and Zn/Ca ratios. Also phosphorus is considered to be of use in estimating the Ca/P ratio and, in consequence, in determining the process of diagenesis.

The odontological and osteal material under analysis in the present study came from a burial site situated near the orthodox church in Trepcza (Southern Poland). That archaeological site dates from the 12th century. During field studies, 105 graves were explored and 40 individuals were isolated using an anthropological analysis. Teeth and bones were obtained from adult individuals only. For each tooth, enamel was separated from the dentin. In consequence, 54 samples were obtained for a physicochemical analysis (3 samples for each individual).

Significant differences were found in the levels of studied elements both between sexes and among historical populations studied. The tracking of the concentrations of trace elements in teeth and bones is a viable and reliable method by which the biological and socioeconomic status of historical groups can be verified.
A MULTI-ELEMENTAL STUDY OF LONG BONE DIAGENESIS IN NAPOLEON SOLDIER’S SKELETAL REMAINS

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The flame atomic absorption spectroscopy method of analysis was applied determining the concentration of zinc, copper, lead, manganese, magnesium, calcium, and iron in long bones of skeletal remains of Napoleon soldiers. The elemental analysis was carried out to assess post-depositional or diagenetic changes in bone tissue. The concentration of single element was determined in a cross-section through the cortical bone. The special case when archeological material (bronze button) was found close to bone surface is discussed.
WEAPON-INDUCED TRAUMAS IN PLINKAIGALIS IRON AGE BURIAL GROUND

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Plinkaigalis burial ground (5th-6th c.c. AD, attributed to Middle Iron Age according to Lithuanian archaeological periodisation), located in Central Lithuania, and is one of largest necropolises of this period. It serves as a model burial ground in numerous analyses due to complete excavation, excellent preservation and good documentation of grave goods and skeletal material. Paleopathological analysis revealed several cases of unhealed wounds that could be analysed from the point of view of medical criminalistics. Grave No.76 contained 30-35 year old male. His skull bore a c. 9 cm long penetrating wound crossing right coronal suture; this lethal wound most probably was caused by an axe, blade of which crossed skull vault, brain and reached internal basis of skull. Quadruple grave No.162 contained two children (3-4 and 8-9 years), female (25-30 years) and male (55+ years). Female had arrowhead embedded into major trochanter of left femur and comminute fracture of mandible, male – perimortal fractures of mandible and maxilla, possibly caused by two different blows. Group grave No.336-337 also contained four individuals: two children (2-3 and 10-11 years), male (45-50 years) and female (40-45 years). Skeleton of male contained arrowhead in lumbar vertebrae and penetrating wound on frontal bone without signs of healing (regretfully, margins eroded postmortally), female – multiple linear fractures of the skull. Overall sex ratio of traumas in this sample shows definite male prevalence (only 11% of all traumas were found on female remains). However, for violence related traumas female part was slightly larger (15%), and even larger for lethal traumas (33%). Conclusion is made that such pattern of traumas and presence of “mass graves” possibly indicate presence or organised warfare between communities, probably a repercussion of “Peoples wandering” period (invasion of nomads from southern steppes).
TUBERCULOSIS IN MEDIEVAL DENMARK

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Tuberculosis has been studied many times paleopathologically. This study is aimed at creating a basis for sound epidemiological statements about tuberculosis in the Danish Middle Ages. During my search for traces of tuberculosis I examined 399 skeletons from medieval Denmark. In this process four distinct, tuberculosis related bone lesions were defined. A very large number of skeletons had some kind of bone changes on the iliac auricular face. The spine, wrist and knees also showed a high number of erosive lesions. All of these lesions are described in the pathological literature about tuberculosis. A total of 107 skeletons had all four joints (iliac auricular face, spine, writ and knee) preserved, and 76 of them had at least one tuberculosis related lesion there. These four lesions can be considered to be pathognomonic. The occurrence of these lesions associate (in most cases statistically significantly) with similar changes at a dozen other locations in the skeleton. It will be explored whether these co-occurrences can lead to the development of new diagnostic tool in tuberculosis paleopathology and thus facilitate the estimation of tuberculosis prevalence in the past.
POSSIBILITIES FOR INHUMATION TIME DETERMINATION DURING SKULL VAULT ANALYSIS

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Estimation of bone inhumation time is the one of key problems in forensic osteology, because for legal purposes it is important to determine the burial time and conditions in which skeletal remains were before being submitted for analysis. For this purpose there are many methods used (morphological, determination of proportion of mineral and organic substances in the bone, fluorescence of bone in ultraviolet light, radionuclid analysis, penetration of ultrasound). However, they do not always give reliable results and are not coming up to expectations of police officers. Accumulation and release of inorganic elements from bone is a known feature for some time already, but changes of their concentration over time are not completely explored, particularly in the cranial vault bone tissue. We conducted study of a small group of adult skulls, which were skeletonized in soil, with different burial time at different places. We used visual, stereomicroscopic, bone cross sections and bone tissue elemental composition methods. The results showed differences of the inorganic elements in the investigated material. It seems encouraging that this method may be useful in time determination of bone inhumation.
OSTEOLOGICAL SEXING OF CREMATED HUMAN REMAINS: AN ACCURACY TEST BASED ON GENDER-RELATED GRAVE GOODS

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Osteological sex determination is one of key demands for archaeologists studying past societies. However, the common practice of cremation often left the scientists with very uninformative material. The accuracy of sexing techniques is thus crucial when employing cremated remains. Most societies that cremated the dead left no records about their sex. Actually, the only available testing method is correlation of the determined sex with the grave goods that are generally related to gender.

Modern archaeology views gender as a cultural category that is not always parallel to biological sex. One has to consider cultural differences and probable cross-gendered attributes of mortuary rituals. A reliable analysis is possible only within one particular society.

A sample of cremation burials from East Lithuanian barrows (3/4–11/12th C.) is used to test the accuracy of osteological sexing. 361 cremation from 67 cemeteries were analysed macroscopically. Remains of at least 446 individuals were detected. The sex of 156 individuals could be determined (eliminating subadults, unsexed adults and those buried in group burials). 79 males and 77 females were identified.

The gendered grave goods were defined namely for East Lithuanian Barrow Culture. Generally, weapons are considered masculine, while most of ornaments and some tools – feminine items. Gender-related grave goods appeared in 81 sexed adult burial.

The grave goods corresponded to the biological sex in 56 (69,1%) cases. Noteworthy is the fact that most (19 out of 25) cases of mismatch are biological males given feminine cerements. This can be explained through peculiar burial rites. Out of all female graves, only 6 (14,6%) contained masculine items.

The accuracy of osteological sexing of cremated remains can thus be defined as no less than 70% and probably even 85%.
INHABITANTS OF MEDIEVAL WROCLAW (POLAND)

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Historical and archeological accounts of Wroclaw include details of the city’s ethnically and socially diverse population.

This synthetic account, apart from a detailed morphological characteristics, also features an assessment of the life style and health conditions of Wroclaw’s medieval residents. Findings from seven archeological excavations were brought together: Olbin (12th-13th century), Dominican Square (12th-14th century), Szewska Street (14th-15th century), churches of St. Elisabeth (13th-14th century), St. Jacob (13th-15th century), St. Idzi (14th-15th century) and St. Christopher (15th-16th century).

A skull-classifying dendrogramme applied to male and female skulls from Wroclaw excavations showed diverse results. Skulls from the St. Elisabeth’s and St. Christopher’s collections proved to be the most similar, given the socio-economical discrepancy between the two series. A different morphology compared to other Wroclaw collections was observed in the other series.

The adult life height of Wroclaw residents varied between an average of 163 and 168 cm for men and between 154 and 157 cm for women.

The largest proportion of *cribra orbitalia* was observed in the community with the lowest living standards (St. Christopher’s series), while the lowest proportion was found in burgurers living in better conditions (Dominican Square series: 17%; St. Elisabeth’s: 17%; Olbin series: 19%).

The social status of burgurers and their belonging to low or high Middle Ages times has a substantial influence on the occurrence of enamel hypoplasia. Hypoplasia was more frequent among men (31%) than women (23%).

Harris lines as analysed on tibia bone X-rays indicate common pattern of occurrence in the Wroclaw bone collections, with a higher occurrence among men. The evolution of Harris lines in time is inferior among adults than among children and youths, indicating a higher life expectancy among individuals who were not subject to physiological stresses in infancy.

Wroclaw medieval population was also subject of infectious diseases, traumas, degenerative changes, metabolic anomalies and malign tumors.
FRAGMENTED COMMINGLED HUMAN BONES OF MIGRATION PERIOD (450-600 AD) MORTUARY HOUSE AT LEPNA SAAREMAA (ÖSEL ISLAND), ESTONIA: POSSIBLE USE OF TEETH

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In current work human skeletal remains of mortuary house of Migration Era in Saaremaa (Ösel) Island, Estonia were examined. It was quite sensitive material, as we do not have many human remains from this period in Estonia. Also it was the first mortuary house excavated in Estonia. Probably remains inside the building had originally been placed on top of dry-laid wall in bowl or boxes and later remains tumbled down with it. Bones were not buried into the surface and probably stayed for a long time in the open air. So the bones were extremely fragmentary, commingled and badly preserved. It was not possible to separate individuals. First aim was to establish the minimum number of individuals (MNI) buried in mortuary house. As the teeth were very well preserved then it was decided to use the teeth for determination MNI. Teeth also enable to examine the age distribution of individuals. The usual method of counting pars petrosa ossis temporalis gave MNI 25 including one newborn and 4 children. Counting and sorting of teeth according to teeth type, attrition degree, formation stage (in case of children), VL and MD dimensions, occurrence or absence of enamel hypoplasia and dental calculus, gave the minimum number of individuals higher, especially increased number of children. It was also possible to determine probable age of individuals.
The relationship between skeletal length measured in the grave and total femoral length for Danish populations from the medieval period (1050-1536 AD) have earlier been subjected to analysis. This has however primarily had one site in focus. The present study presents a broader comparison of stature on skeletal material from six Danish archaeological sites (Ribe Grey friars, Ribe Cathedral, Tirup, Sejet, Nordby and Set. Mikkel cemeteries). Males and females were included if either the skeletal length in the grave or the total femoral length had been measured. The samples span the medieval and historic periods in Denmark (approx. 1050-1700 AD) and all have a geographical origin in Jutland. Both rural and urban populations are represented in the material. Stature was analysed by regressing total femoral length on skeletal length measured in the grave and then comparing the regression parameters.
DENTAL STATUS OF INDIVIDUALS BURIED IN AND AROUND TRAKAI CHURCH

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The aim of our study was to evaluate dental status of individuals buried in the 14-16\textsuperscript{th} cc. and excavated during reconstruction of Trakai church. Only adult individuals with established age at death and sex were included in the analysis. All material was divided in two samples: individuals found in the churchyard (122) and individuals buried inside the church – in the presbytery (39). Dental analysis included the penetration and location of carious cavities, antemortem tooth loss (AMTL), abscesses and degree of dental wear. Results revealed worse dental health in the churchyard sample. Individuals from the churchyard had statistically higher number of carious teeth to compare with the presbytery (23.6 and 15.2 % accordingly). Churchyard sample was also characterized by statistically higher prevalence of AMTL (9.7 and 4.1 % of affected teeth) and abscesses (4.4 and 2.2 % of affected teeth) and a higher degree of dental attrition. Severity and location of carious cavities revealed similar patterns in both samples: enamel caries predominated over more severe lesions and approximal surface was the most frequently affected. Analysis of sexual differences in dental health revealed no differences in the churchyard sample, however, in the presbytery females had statistically higher number of carious teeth and AMTL in comparison with males. It is likely that differences in dental health between the samples could be attributed to the differences in social status of individuals buried inside and outside the church. This assumption was confirmed also by osteometric analysis.
SITE REPORT: THE INCIDENTIALLY FOUND MEDIEVAL CEMETERY BY THE FORTRES GAMMEL BRATTINGBORG, SAMSØ, DENMARK

T.S. Nielsen

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Population estimations from incompletely excavated graveyards are often difficult to carry out. Nevertheless, by paying close attention to the information that is present, and by considering the population and the special features of the surroundings, a reasonable approximation can still be achieved.

During the preliminary excavations of a medieval fortification, near Tranebjerg on the island of Samso, a so far unknown early medieval cemetery appeared. The island of Samso was of a great tactical value in the Medieval Denmark. From a base here, one could monitor most of the sea traffic between the North Sea and the Baltic Sea.

Stones originating from the mentioned fortification cover most of the graveyard area. This has protected the graveyard underneath from ploughing and has therefore contributed to the preservation of the skeletons. The skeletons of infants and smaller children buried in shallow graves were preserved in higher numbers than usually seen in Denmark.

The archaeologists did not excavate the graveyard further down than approximately 60 cm, so relatively few adult skeletons are present in the retrieved material, though more graves were registered.

As the site was not dug very deep, and the part that was excavated is from depths that are rarely preserved due to ploughing this makes the estimations even harder. However, an attempt is made by among other things taking into account the higher frequency of infant skeletons registered. Comparing the Gl. Brattingborg cemetery to another graveyard in Denmark – the completely excavated Tirup graveyard the question about the total number of graves at the site and thus the size of the population using the site for burying their dead is approached.
CRANIOFACIAL ROBUSTICITY WITHIN TWO GROUPS OF MEDIEVAL SKELETONS FROM DENMARK

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Robusticity is a relative concept. It is about being powerfully built compared to others. With regard to the postcranial skeleton it traditionally concerns the overall size and thickness of the bones and the development of muscle attachments. Regarding the cranium robusticity is about shape (not absolute size) and about the presence and development of superstructures. The cranial superstructures were for a greater part lost or diminished during the evolution of Homo sapiens that amongst other things is characterized by a gracilisation of the skeleton. As such only few recent populations have retained the robust features that characterized the crania of early Homo sapiens. However the degree of robusticity varies naturally both on a local/regional scale within populations as well as among populations.

In a small study of craniofacial robusticity within two groups of medieval skeletons from Denmark it was found that robusticity is a complex phenomenon, which is expressed in different ways. Furthermore it could be confirmed that males generally are more robust than females, while age seemingly does not influence the degree of robusticity. Lastly there is a general connexion between robusticity and cranial size, which however is not unambiguous.
AN APPROACH ON INVESTIGATION OF DEGRADED GENETIC MATERIAL

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The investigation of aged human genetic material by using the traditional genetic tools such as short tandem repeat (STR) analysis systems causes many problems in medico legal practice. A new approach is presented on investigation of the degraded genetic material by using the novel mini short tandem repeat (miniSTR) system in degraded DNA samples.

The aim of this work was identify the remains of the mass grave from Tuskulėnai by using STR systems.

The aged skeletal remains submitted for investigation were from the mass grave of victims from Tuskulėnai, Lithuania (1944-1947). The investigation of two persons’ bone fragments was performed. The first step of identification involved the analysis of documents and anthropological determination. DNA was extracted by using phenol-chloroform method; purification was done with Qiagen PCR Purification Kit. Amplification was carried out with the AmpF/STR Identifiler PCR, AmpF/STR Minifiler amplification kit (Applied Biosystems) according to the manufactures protocols. The amplification products were analyzed on the ABI PRISM 3130 Genetic analyzer. The analysis of data was performed by GeneMapper v3.2.

By using the AmpF/STR Identifiler PCR system on samples investigation the partial profiles were obtained, the dropout of the larger molecular weight loci resulting in partial or no results. The same samples investigation with miniSTR system provides possibilities to get full profile of degraded genetic material with high discrimination power. The use of miniSTR system on aged skeletal remains investigations is may be considered a useful tool for forensic identification.
THE PALEOPATHOLOGY OF THE NEWLY DEFINED BONE CONDITION ‘FOS’.

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A characteristic pattern of previously undescribed bone changes has been observed in skeletal samples from the Danish Medieval Period and is given the name Focal Osteolytic Syndrome or in short FOS. The bone changes could be mistaken for post-mortem destruction of bone through the action of plant roots or other taphonomic processes such as acidity of soil and groundwater. However, in many cases what seems to be a vital reaction is seen in connection to the bone changes, which indicates that the individuals were alive when the lesions in the bones were formed.

A manual describing the bone changes related to FOS has been constructed. On the basis on this manual 646 skeletons from five cemeteries dated to the Danish Medieval period approx 1050 – 1536 AD were registered. The bone changes are visualised and the probable pathological origin of the lesions are examined by means of high-resolution CT scanning and light microscopic analysis. FOS related lesions were not uncommon in medieval Denmark. It appears that the prevalence was higher in Jutland than on the Danish Islands and higher in the early Middle Ages than later in history. A study of 60 medieval skeletons from Italy showed no signs of FOS and the condition is unknown in modern populations.
PERSONAL IDENTIFICATION IN THE MESOLITHIC – SEX DETERMINATION OF A CASE FROM DENMARK

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A major problem in studies of the anthropology of prehistoric populations is the determination of sex and age of individuals. Only in very few cases can the determination be performed from data other than the skeleton in question. When doing such determinations, methods based on recent skeletal samples are employed, introducing the possibility of errors due to population specific patterns of e.g. sexual dimorphism and age changes.

One such case is the geologically oldest human skeleton found until now in Scandinavia, the skeleton from Koelbjerg, Funen, Denmark, dated to 9250 ± 85 years BP (K-4063). The skeleton was found in a bog during peat digging in 1941. The skeleton is fairly well preserved, with i.a. the cranium and mandible, several long bones, and the sacrum and right part of the pelvis, without the ischium.

In the first publication on the skeleton (1943), the authors acknowledged that the sex determination posed problems. The cranium indicated male, whereas the long bones clearly indicated female, by very low indices of robusticity. The pelvis was also claimed to have female features, though no qualifications for this inference were given.

More recently the skeleton was restudied, and again the sex was determined to be female, but likewise with no testable arguments in favour of the pelvis representing a female.

In the present study we present a morphometric study of the cranium, comparing it to more or less contemporaneous crania from Europe, showing that the Koelbjerg cranium in this populational context seems to be masculine, though not decisively so. Furthermore, we present two arguments for a revision of the sex determination, both based on the pelvic remains. The first argument consists of a list of morphological features, all of them more or less reliable as sex indicators, and with some of them not being decisive in the actual case. The second argument is based on a morphometric procedure, the DSP (Diagnose Sexuelle Probabiliste), developed at the Laboratoire d'Anthropologie des Populations du Passé at Bordeaux University. This procedure has been proven to be extremely reliable in sex determination. When applying the method to the Koelbjerg skeleton, we obtain a posterior probability for male of 95,5%.

Our contention is that the pelvis is the most reliable region of the skeleton for sex determination, and thus, the conclusion is that the Koelbjerg skeleton represents a male from the Maglemosian in Scandinavia. The fact that the long bones are indeed gracile simply indicates that this individual was a gracile male. The cranium is robust but still in a different way than in, say, Mediaeval populations. As patterns of sexual dimorphism can vary considerably between populations over time and/or geography, great caution should therefore be taken when determining sex for individuals from not well known populations, using skeletal parts other than the pelvis.
DNA IDENTIFICATION OF RADVILOS (RADZIWILL) FAMILY REMAINS BY mtDNA AND Y-CHROMOSOME ANALYSIS.

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Genetic analysis of the Radziwill family includes five skeleton remains that were found in secondary collective burial during archeological research that was performed on the site of former Dubingiai castle and church (16th-17th century AD), Lithuania. Anthropometrical analysis determined the gender of each individual; there were buried two females and six males [1]. DNA was isolated from teeth using non-destructive method [2]. Isolated DNA was used in mitochondrial DNA analysis and compared with maternal line of Radziwill family living in Poland nowadays. We tried nuclear DNA identification either. We analyzed SNPs polymorphism on Y-chromosome [3] and rs17287498, rs3091244, rs2069945, rs9275142, rs385780, rs3818367 creating small identification panel [4]. Our results didn’t resolve the Radziwill mystery but throw light on.

APPLICATION OF ICP–MS FOR THE INVESTIGATION OF ELEMENTAL DISTRIBUTION IN ARCHAEOLOGICAL BONES

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Quantitative analysis of inorganic trace elements (such as strontium, barium, zinc, lead) incorporated into bone mineral, and more recently, in teeth, bones and hair, has been used to address questions of diet, nutrition status, pathology, and mobility. Analysis of these specimens is difficult due to the low concentration of the elements of interest compared with the high concentration of the hydroxyapatite matrix elements.

The aim of our research was to determine several trace elements in archaeological bones in order to obtain information on paleodiet of medieval urban and rural population of Latvia. Archaeological bone samples from the cemeteries of St. Peter’s Church in Riga (13th–17th century), Veselava in Cesis (14th–17th century) and Jurkalne in Liepajas district (16th–17th century) were analyzed. Analyses of bone samples were performed by ICP-MS method. For quality control and method validation analysis of NIST-SRM 1486 (animal meal) standard reference material was used.

Medieval diets typically has showed strong dependence on social status of the individuals. Strontium, barium, lead and manganese content, determined in this study, was significantly higher in urban bone samples of individuals compared with two rural cemeteries. It can be concluded that diet of rural region population was similar and more pure than of Riga city population.
PALAEOPATHOLOGY OF TWO FINNISH MEDIAEVAL TO POST-MEDIAEVAL CEMETERIES

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A sample of 53 skeletons from an urban, coastal town cemetery of Porvoo and a sample of 56 skeletons from a rural inland parish cemetery of Renko have been studied. Both excavation sites are just outside of medieval stone churches. The Porvoo cemetery has been used from medieval times until the 18th century and the Renko cemetery until the middle of the 19th century. More precise datings are available for a few of the younger graves.

The objective of this study is researching the relationship of nutrition and health in early urban and rural settlements in Finland. Palaeodemographic profiles indicate higher infant mortality in the town of Porvoo than in Renko. Another interesting feature of paleodemography is that young adult women outnumber young adult men especially in Renko. Most of the infants from Porvoo cemetery seem to exhibit signs of scurvy. Cribrum orbital was twice as common in Renko where most individuals with cribra orbitalia had died as children. In Porvoo, on the other hand, people with cribra orbitalia had died as adults.

Also, stature may have been affected by nutritional factors. In both samples, individuals exhibiting enamel hypoplasia average shorter than that not exhibiting enamel hypoplasia. Differences in nutrition may also reflect as differences in dental problems. Caries is more common in the Renko sample.

Other factors of health were also considered. Osteoarthritis and tumors were more common in older adults as expected. Signs of trauma were found to be more common in men in both populations. Slight congenital defects were common, especially ankylosis of distal foot phalanx or sacrum and coccygis. In Porvoo, also a more severe congenital defect, a case of trisomy 18 was diagnosed with the help of neuro-osteology and Inger Kjaer. Endocranial woven bone formation was found especially in children. Charlotte Roberts et al have sampled individuals from Porvoo with calcified pleura for tuberculosis DNA analysis. All the bones from Porvoo have been X-rayed, but the interpretation of the findings is still in progress.
TREPONEMAL LESIONS IN A SKELETAL SAMPLE FROM EARLY MEDIEVAL DENMARK (1100-1350 AD)

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The Pre-Columbian history of syphilis / Treponema disease in Europe is controversial. In order to clarify the history of these diseases skeletons from one securely dated Pre-Columbian Danish skeletons have been analyzed.

A total of 90 adult and 19 sub-adult individuals from the Refshale cemetery were examined for syphilitic / Treponema related lesions. The Refshale cemetery was that of a rural community and was situated in the middle of the island of Lolland in south-eastern Denmark. According to the excavation report the churchyard had been in use between 1100-1350 AD. Sources of dating are the grave goods as well as the arm positions of the skeletons that are representative for four different medieval periods. So far no 14C dating has been carried out.

None of the 286 partially or completely preserved calvarie and naso-palatine bones showed any signs of pathological changes indicating Treponema disease. However 55 out of the 1374 tubular bones were affected with some sort of systemic disease. The 204 skeletal elements of the sub-adult individuals did not reveal any Treponema bone changes. Further analysis regarding lesion prevalence, nature and severity of the lesions, as well as age and sex distributions between affected and unaffected individuals were computed. The results were compared with those of analyses of middle and late medieval as well as early modern Danish skeletal samples. The six affected individuals from the early medieval graveyard showed lesions only of osteoblastic nature, but those were scattered over multiple bone elements. Both the selection of the affected bone elements and the diagnosed pathological changes are indicating infections with some sort of Treponema.
FORENSIC MEDICAL INVESTIGATION OF SKELETONS FROM TUSKULĖNAI MASS Graves, VILNIUS

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The aim of the paper is to present results of forensic, examination of remains of individuals executed in KGB prison in Vilnius in 1944-47. During 1994 and 1995, 706 skeletons were exhumed by archaeologists and anthropologists, and 18 more skeletons were found in 2003. In total, 720 males and 4 females, age range from 19 to 66 years, were investigated. Each skeleton was analysed according to routine forensic protocols in the laboratory of medical criminalistics. Details of execution and the way of handling of bodies were reconstructed. 97 percent of skulls had perimortal lesions. Gunshot injuries were found almost exclusively in skulls and only in few cases on other parts of the skeletons. In 492 cases lesions were caused by one bullet, in 110 – two, in 31 – three, in 13 – four, in 4 – five, in 1 – six bullets. Caliber of bullets was various (from 5.6 to 9.0 mm), what corresponds with indications of evidences. In overwhelming majority of cases, shots were performed into occipital area (more often to the left side). Multiple shots and cases of bullet impacted in the skull vault prove the use of control shots when body was lying on the concrete floor of the execution camera. Other kinds of skull lesions: caused by blunt instrument – 118, stabbed wounds – 106 cases, cut/strike – 4 cases. Majority of stabbed wounds were performed with four-edged instruments or bayonets. In 6 cases, quadriangular 3x3 cm entrance and 0.5x0.5 cm exit holes in skulls were found, proving that the blow with bayonet was performed for laying victim.
LEAD IN BONES IN A HIGH SOCIETY IRON AGE POPULATION

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Archaeologists usually interpret their findings from what they can actually see, macroscopically. Using different natural scientific methods, an entirely new world unfolds right in front of their eyes. Cremated bones are usually much reduces in information regarding the individual compared to non-cremated bones.

At ADBOU the remains of more than 2000 cremated individuals had been stored by the Odense City Museum for several years without any interest to the staff or students. The project has its origin in the question: “what can we do with these bones”. The attempt to extract reproducible information from the fragments of cremated bones reported on here relates to lead levels in the bones. The test includes samples from about 60 skeletons (most of the cremated) from the Danish prehistory, from the Neolithic to the medieval period, and 2 individuals from the Bass Collection in Knoxville, Tennessee (USA). The lead level was determined by AAS (Atomic Absorption Spectrophotometry). Individuals from different (pre)historic periods were compared for bone lead content. It appeared that there was a standard level for the lead content in human bones. However, some individuals stuck out. The reason for this is discusses: Were these people of a higher class or did they have a different diet that increased the lead content in the organism? Or could it all simply due to post mortal processes in the soil?
FORENSIC ANTHROPOLOGY FROM THE PERSPECTIVE OF FORENSIC PATHOLOGY

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The author has practiced forensic medicine since 1972. Only late did he become aware of the possibilities and dormant skills in forensic anthropology. The first close encounter was with American and Argentine physical anthropologists in human rights cases. Eventually the author was able to form the opinion of the profession that he has of today. This opinion will be revealed based upon case stories.
The main goal in the field of paleodemography is the identification of factors that influenced the development of historical populations. Some structural changes in the mediaeval Danish society can be seen in the mortality profile estimated from the cemetery of S:t Jörgen parish in Malmö (A.D. 1300-1530).

For most ancient populations there is a clear difference between male and female mortality regimes. On the basis of three populations from different time periods in southern Scandinavia, the change from an historical to a modern mortality regime can be recognized. The skeletons from the Late Mediaeval sample show no significant difference between male and female survival for all age groups. The comparison with an Early Mediaeval Danish skeletal sample and Early Modern life tables from Sweden shows that the period might be the turning point between the different mortality regimes. This transition runs parallel to important changes in the subsistence patterns between the communities.

The population decrease in 14th century triggered changes in the structure of society. In the towns, the number of inhabitants was maintained by the inflow of immigrants from the countryside. Information about the burial period of a skeleton is provided by the arm position. In combination with the estimated age-at-death and sex of the individual, this is utilized to test the hypothesis that the mortality in the sample was partly shaped by migration. The result is significant for the differences between the women and in the sub-adult age groups over the observed time period. The most evident display of immigration can be seen in the increase in the proportion of young women over time. No similar pattern can be observed in the male sub sample, where the proportion of deaths in the single age classes stays nearly the same over time.

These results proof that an unbiased mortality profile reflects shifts in historical populations and can help to understand the processes that shaped a skeletal sample.
HUHTINIEMI IN LAPPEENRANTA, FINLAND: A FORENSIC CASE THAT BECAME ARCHAEOLOGY

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Huhtiniemi is a camping ground at the shore of Lake Saimaa in the city of Lappeenranta, SE-Finland. For centuries persistent rumours had implied that the Finnish army would have secretly executed and buried Finnish deserters at the site during the Continuation war in the summer of 1944. During 2005 the city of Lappeenranta conducted a rough test excavation with bulldozer and confirmed the existence of human remains at the site. In order to ascertain if the bodies derived from 1944, the Department of Forensic Medicine and the Department of Archaeology at the University of Helsinki were contacted. An excavation was organized at the site in October 2006. This was the first time that the two departments collaborated with a joint excavation.

The excavation revealed a mass grave with at least 11 intact skeletons. The bodies, all men, were buried without coffins in a single row. Since it was a possibility that the deceased could derive from 1944 the police took officially over the investigations. The excavation aroused huge media attention and even political linkage after the Finnish Prime Minister, Matti Vanhanen, suggested establishing a truth commission over the Huhtiniemi investigation.

However, the excavation revealed that the deceased had been buried in traditional Greek orthodox position, with the arms crossed over the chest. In addition, almost all bodies had bronze or silver crucifixes around their necks. Small buttons found in the pelvis area could possibly derive from underwear.

During the analysis of the bones and the objects it became evident that the mass grave can not derive from 1944, but more probably from a Russian military hospital from the 1850’s. Since there was no sign of violence on the bones it is more likely that the soldiers had died from disease during the Crimean war.
Complicated demographic processes, connected to the transition to food production economy are reflected in the palaeodemography of the bronze age inhabitants of Latvia. The most representative osteological material of this age has been obtained in complete excavation by J. Graudonis of the cemetery of Ķivutkalns. Sex and age could be determined for 188 out of 238 inhumations. 8.5 % of the burials were infants up to the age of one year, 26.6 % are children aged up to 4 years, and 43.9 % are up to 14 years.

Level of adolescent and juvenile mortality is low and indicates that the population at Ķivutkalns probably did not suffer from epidemics. Life expectancy at birth without compensation is estimated at 21.8 years.

Sex and age determination was possible for 59 males and 61 females. Female mortality maximum is found at the age interval 20-34. The high mortality of young females might be explained in terms of intensive reproductive stress in the age range of 20–30. Female life expectancy at age 20 is only 13.3 years. Since a considerable proportion of women died young, the reproductive potential $R_{pot}$, comes to 0.572. Average number of children per women was 4.3.

High male mortality is found starting with the age of 30, it reaches maximum in the age interval of 40-44. Calculated adult male life expectancy is 21.1 years.

Overall, we find that high child mortality up to the age of four was characteristic of the bronze age inhabitants of Latvia, and reproductive stress caused increased mortality among young women aged 20–30. Compared with the Neolithic period, male life expectancy had increased significantly.