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For four years the French archaeological expedition, guided by Prof. Olivier Rouault (University Lyon 2 – Lumière) and Prof. Maria Grazi Masetti-Rouault (Ecole Pratique des Hautes Etudes, Paris), has been conducting research at Qasr Shemamok. The excavation site, citadel and lower town, covering an area of around 70 hectares, is situated about 25 km from Erbil (capital of Kurdistan). Since 2013, the projects have also involved research on human remains. The biological project (Qasr Shemamok site) is conducted by the Department of Anthropology of Cardinal Stefan Wyszyński University in Warsaw (Poland). The aim of our research is to try to give biological characterization of the human population of Qasr Shemamok in different chronological periods, and compare the obtained data with other sites from the Near East (e.g. Terqa, Tell Masaikh) (e.g. Tomczyk 2013a, 2013b). Human bones from Qasr Shemamok were studied in the laboratory in Erbil's museum. All teeth and bone samples were exported to Poland for further laboratory studies. The fieldwork protocol was based on *Standards of Data Collection* (Buikstra, Ubelaker 1994), with some additional observations and measurements

In sum, remains of 6 individuals have been found at Qasr Shemamok (Table 1). They were dated to the Middle Assyrian periods. However, there are no doubts that Qasr Shemamok has got older history.

A very interesting case from Qasr Shemamok was labeled QS03 A 131. The remains were found in the jar. The state of preservation of the postcranial skeleton was good, however the skull was seriously destroyed as a result of deposition in the grave. The body was lying on the back with the head pointing upwards. With the remains, in region of the upper part of thorax, I found elements of neckle. The skeleton was recognized as a 4 year old child (dental age) (Buikstra, Ubelaker 1994).

Cribrra orbitalia was detected on the preserved right orbital roof. Using the revised version of Nathan and Haas (1966) and Stuart-Macadam's (1985) criteria, we observed 'cribrotic type' Nr 2 (small as well as large and isolated foramina) (Fig.1).

Fig.1. Cribrra orbitalia on the right orbital roof (QS03 A 131).



Thinning of the periosteal and cortical layers was observed on the vertebral and sternal extremity of some ribs and proximal epiphysis of both tibias under the tuberositas (Fig. 2)

Table 1. Human remains from Qasr Shemamok (season 2013). SP – State of preservation: 1 – very poor, 2 – poor, 3 – good, 4 – very good; Upper limbs: humerus, ulna, radius, hand; Lower limbs: femur, tibia, fibula, foot; Central part: vertebrae, ribs, sternum, clavicle, hip.

No	ENT#	Sex	Age	Chronology	SP	Skull	Central part	Upper limbs	Lower limbs	Comments
QS03 A 006	1618	?	Adult	Middle Assyrian	3				+	Material found among animals remains
QS03 A 011	1618	?	Adult	Middle Assyrian	2			+		Material found among animals remains
QS03 A 116	091	F	18/20	Middle Assyrian	2	+		+	+	
QS03 A 122	096	F	20/25	Middle Assyrian	2	+	+	+	+	
QS03 A 131	104	?	4,0	Middle Assyrian	3	+	+	+	+	See below
QS03 A 134	041	?	Adult	Middle Assyrian	4				+	Only tooth and patella

Fig.2. Anterior view of the proximal epiphysis of left tibia (QS03 A 131)



Such lesions can be indicator for hematopoietic diseases (e.g. anaemia). In general, types of anaemia can be distinguish between genetic and acquired forms (Ortner 2003, Sullivan 2005, Aufderheide, Rodríguez-Martin 2008). However at this stage of research is not possible to verify the type of diseases (Stuart-Macadam 1985, Keenleyside, Panayotova 2006, Rothschild 2012).

Archaeological excavations in Qasr Shemamok are connected with the biological researches. It will be conducted comprehensively, which means that it will include anthropological, zoological, botanical, genetic, and chemical analyses. Their analysis will provide important information not only about the environment but also about the adaptation strategy of local population.

1. Significance and scientific aim of the project

The significance of the project results, firstly, from the fact that human populations inhabited Qasr Shemamok has never been analysed. Secondly, the significance of the project also results from its interdisci-

plinary character as understood in a broad sense. Not only anthropologists, but also dentists, geneticists, physicists have been invited to the project.

The problem is expanded through the following questions:

- what was the average life expectancy of the local populations in different chronological periods?
- what was the body height of the population from Qasr Shemamok? (Since body height is a good indicator of prolonged stress, it can therefore be expected that also in this case tallness will indicate the well-being of the population).
- what was kind of diet and food preference.
- what was the level of health and hygiene of the population from Qasr Shemamok? (It can be expected that the increase of population, which has a negative effect on living conditions, will find its reflection in the occurrence of enamel hypoplasia, dental caries and some pathologies; e.g. tuberculosis, leprosy).
- what was the time of weaning a child?
- was the population of Qasr Shemamok a group consisting of migrants or was it homogeneous?
- study of chosen (tuberculosis, mucoviscidosis) genetic tendencies of the population.

2. Concept and plan of research

The project suggested by our team is based on a multidisciplinary approach. It seems that the involvement of specialists from different disciplines (anthropologists, dentists, paleopathologists and geneticists) guarantees complex and, at the same time, thorough study of transformations taking place in the populations from the area in question.

The project is planned in two stages:

a) Researches in Erbil (Kurdystan)

Anthropological analysis

At the moment the material is deposited in the Erbil Museum (Kurdistan) and the Department of Biological Anthropology (Cardinal St. Wyszyński University, Warsaw). In the local laboratory the human bones and teeth will be conserved and cleaned. Next, each skeleton will be described using a standard form based on the *Standards for Data Collection from Human Skeletal Remains* (Buikstra, Ubelaker 1994) which contains the following observations:

- state of bone preservation (described in a 4-grade scale);
- sex and age assessment;
- 34 basic metric skull measurements;
- 52 basic metric measurements of the postcranial skeleton;
- 15 additional measurements of children's bones;
- 38 basic measurements of non-metric skeletal traits;
- if possible, taphonomic description of the skeleton and its context.

All the observed bone changes will be precisely documented, photographed and described on separate forms.

During this phase of research samples will be prepared from the material and transported to other specialist laboratories.

- b) Researches in specialist laboratories; requiring detailed analysis, will be performed in different laboratories in Poland and others European countries. The detailed analysis will include:

Odontological analysis

One of the project aims is the assessment of the level of health and hygiene of the population of Qasr Shemamok. For this purpose the odontological material will be analyzed in detail, namely, enamel hypoplasia, dental caries, accumulation of calculus and possible periodontal diseases are to be identified. The observation made by an anthropolo-

gist and a dentist guarantees the accuracy of research and minimization of inter-observational error.

The following work will be done as part of detailed analysis:

- exact measurements of dental crowns (BL, MD, height) will be taken within an accuracy of 0.01mm;
- a description of chosen non-metric dental traits will be made;
- estimation of tooth wear (for the surface of anterior teeth – Smith's 8-stage scale, for posterior teeth – Scott's 10-level tooth wear scale). In this analysis special attention will be given to lesions of chemical nature (dental erosion).
- evaluation of calculus accumulation will be based on the observation of crown surfaces;
- studies of enamel hypoplasia. The analysis of enamel hypoplasia will be performed using not only the macro-, but also the microscopic technique, namely, it concerns the analysis of individual hypoplastic lines (e.g. the number of perikymata that make up the occlusal ridge) with the help of SEM. It will be conducted in the Institute of Paleobiology of the Polish Academy of Sciences in Warsaw with whom the project manager has been cooperating for many years;
- dental caries;
- periodontal diseases;

Paleopathological analysis

Information about the level of health is obtained from the observation of a pathological change; it concerns, for example, the presence of tuberculosis (MTB), congenital and acquired syphilis, otitis, leprosy. Radiological analysis will be performed at the Mazovian Polyclinical Hospital, using a GE 64CT scanner. With this device it is possible to additionally scan the pathologically changed area and obtain a 3D image. If necessary, specialists from the Department of Nuclear Medicine of the Bródnowski Hospital in Warsaw will be asked to carry out further paleopathological analysis.

Chemical analysis

It is common in anthropological research to use analysis of stable isotopes both in the context of reconstructing a diet as understood in a broad sense, including the process of weaning stress, and in determining the origin and directions of migrations of prehistoric and historic human populations. Therefore, the analysis of stable isotopes (e.g. $^{18}\text{O}/^{16}\text{O}$; $^{12}\text{C}/^{13}\text{C}$) and some elements (P, Ca, Sr, Ba) will be performed with regard to kind of diet, the weaning process and identification and determination of origin of possible immigrants as well as comparison of the obtained results with source and archaeological data. This analysis will be performed by researches from the Department of Anthropology of the Jagiellonian University, Cracow (Poland).

Molecular analysis

Contemporarily applied research methods enable “multiaspect” analysis of skeleton material. One of the reasons for using possibility of isolation and DNA analysis is the fact that repeatedly, it is available only periodically and then is buried again. More and more efficient methods of isolation of vestigial amounts of degenerated genetic material and the development of molecular biology techniques caused that access to information contained in the form of DNA sequence of the examined specimen became a fact.

Trials for isolation and DNA analysis that will be conducted in the Department of Molecular Biology of Medical University in Lodz (Poland). The teeth and ribs selected from higher parts of a chest will constitute material for DNA isolation, and lack of visible mechanic damages will be assumed criterion. Samples will be collected keeping standard procedures preventing from exogenous contamination of DNA (collection in sterile bowls and gloves, with sterile instruments and closed in hermetic covers; transport of the samples in specially prepared containers).

One of the aspect of the proposed researches will be an attempt to confirm the appearance of tuberculosis in the examined population. We will

now make an effort to identify DNA *M. tuberculosis* by multiplying peculiar, highly conservative, insertion sections present only in the genome of bacteria (IS6110 and IS1081). Parallely with the identification of pathogenic DNA, predisposition to infectious diseases will be estimated, including MTB, analyzing the alleles of the *SLC11a1* and *MBL* genes that take part in making the initial immunological answer. The inactive *SLC11a1* protein favours the development of pathogens through the modification of availability of indispensable iron ions in immune-competent cells, i.e.: macrophages, neutrophils or fagosomes. G/A substitution in codon 543 of the *Slc11a1* gene is responsible for the appearance of inactive albumen in a cell and also for vulnerability to infectious diseases i.a. *M. tuberculosis*. The second of the analyzed genes codes lectin *MBL*, that is necessary in the process of complement activation, the albumen fundamental for immunologic answer, enabling the phagocytosis of pathogens. The ability to activate proteins can be handicapped i.a. as a result of minimizing of its concentration in plasma – some forms of the polymorphic *MBL* gene are responsible for that. The change in codone 54 of exon1 is one of them and it is the cause of even tenfold reduction of the concentration of oligomeric (active) form of *MBL* albumen in serum of heterozygotes.

The last to study in the project is the $\Delta F508$ *CFTR* gene, which presence on both chromosomes 7 conditions the phenotype of cystic fibrosis. The clinical effect of the lack of *CFTR* membrane canal in the membrane of epithelium cells is the production of over-sticky mucus, which presence in the respiratory system causes anoxia and recurrent infections. The frequency of appearance of the lethal allele $\Delta F508$ in Europe is compatible with rising gradient along the north-west/ south-east line and is responsible for approximately 90% of cases of the disease in Denmark and about 25% in Turkey. The reason of maintaining high frequency of this lethal mutation in contemporary European populations has not been explained so far. Initially, it was explained by the selection of the $\Delta F508$ *CFTR* allele, the appearance of successive epidemics of cholera, rising immunity against *M. tuberculosis*, and recently even, started in neolith, introduction of milk to diet; however, none of the conceptions has found definite confirmation.

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