

Reconstruction of diet of population from Roman period (1st–4th c. A.D.) on Pruszcz Gdański cemetery material

Judyta J. Gładkowska-Rzeczycka¹, Václav Smrčka²,

Jaroslav Jambor³

Abstract

The cemeteries of the Wielbark culture in Pruszcz Gdański date back to the beginning of our era. Their location near the Baltic Sea suggests some connection with Germanic tribes. In an attempt to reconstruct the diet of the buried there, 182 bone samples were taken from 48 skeletons there and subjected to analysis for chemical elements. The data show the bone samples had a zinc-dominant microelement composition that has been also observed at Germanic burial places situated along the frontier of the Roman Empire. Our supposition is that the diet of the population was dictated by their customs rather than by the natural environment conditions there.

Judyta J. Gładkowska-Rzeczycka, Václav Smrčka, Jaroslav Jambor, 1997; *Anthropological Review*, vol. 60, Poznań 1997, pp. 89–95, figs 4, ISBN 83-86969-18-0, ISSN 0033-2003

Nutrition strictly connected with the biological development of man both today and in the remote centuries undoubtedly constitutes one of the most intriguing problems.

In space and time terms, dietary habits have been and still are intricately dependent on many factors that might include, for example: 1) the natural environment (the soil, climate, natural resources); 2) the geographical situation (by or near the sea, land-locked, in the

mountainous region); 3) the economic structure (agriculture, animal husbandry, trade, industrial activities in the form of handicraft); 4) local customs; or 5) social and political conditions. No attempt to reconstruct the biostructure (the biological conditions) of an ancient population can thus be made without considering these factors first. To make things worse, the research material here is highly specific, generally incomplete or fractional, and the picture possible to obtain is, more often than not, rather approximate [WALDRON 1994].

The primary research material comes from the results obtained by archeologists, anthropologists, paleozoologists, palinologists, chemists, and other specialists in related disciplines of science.

¹ Department of Anatomy and Anthropology, Academy of Physical Education ul. Wiejska 1, 80-336 Gdańsk, Poland

² Clinic of Plastic Surgery Department of the University of J.E. Purkyne, Berkova 34, 61200 Brno, Czech Republic.

³ Department of Analytic Chemistry, Masaryk University, Brno, Czech Republic.

Recent years have seen the bone chemical analysis becoming commoner and commoner, though it has proved to be a difficult tool through the intricacy of factors necessary to consider [WALDRON 1981, AUFDERHEIDE et al. 1981, 1985, AUFDERHEIDE 1989, GŁĄB & SZOSTEK 1993, JAMBOR & SMRČKA 1993]. Although the interpretation of analysis results requires great care, it is from the chemical analysis that the reconstruction can be done of not only the diet, but also of the customs, social conditions or relations between various groups and tribes in the past, according to Smrčka et al. [JAMBOR 1988, SMRČKA et al. 1988, SMRČKA & JAMBOR 1993].

The aim of the paper is to attempt a reconstruction of the diet of the population that lived in Pruszcz Gdański during the Roman Period.

As archeological sources [PIETRZAK 1970, PRZEWOŻNA 1971, 1974] indicate there were one settlement and four cemeteries in Pruszcz Gdański that belonged to the population of Wielbark (Wielbarska) culture of the pre-Roman and Roman Period. It is one of the most interesting objects known in East Pomerania at the time [PRZEWOŻNA 1970, 1974]. Far from being complete, the data on the place suggest the settlement was a large one and occupied an area of 4–5 hectares. Situated at a lagoon and partially water locked by the river, the settlement had its habitable and "industrial" parts. The basis for its economic life was agriculture, husbandry and trade [PRZEWOŻNA 1971].

Generally, the cereal crops cultivated in Pomerania included barley and, to a lesser extent, wheat and millet. Rye was grown mainly in the period of Migration of People.

In Pruszcz Gdański, a large number of barley grains (63,750) were unearthed along with two grains of millet and some seeds of vetch and other plants and grasses [KLICHOWSKA 1970]. Fig. 1 presents differentiation of cultivated plants in some regions. The data are far from complete, though [WIELOWIEJSKI 1981].

Fig. 2 shows similar differentiation of the animal husbandry. In Pruszcz Gdański, the farm animals bred there included the cattle – 58%, the sheep – 24%, and more rarely, the pigs – 18%, and the horses – 5%. The hunting habits were also regionally differentiated. In Pruszcz Gdański, for example, the game was predominantly the beaver (77%), the animal then indigenous to the region [WIELOWIEJSKI 1981].

The agriculture and husbandry structure in the East Pomerania was clearly different from that of southern Poland (Przeworska culture) mainly because of different natural environment, but in its economic structure it strongly resembled the western region of the Baltic Basin [WOŁĄGIEWICZ 1981].

In the East Pomerania metallurgy was very well developed and based on domestic resources of bog iron stone and swamp iron stone. Iron stone deposits rich in pure iron and phosphor were similarly abundant as these of the Mecklenburg region [BÜLOW 1949, ERNST 1966] and amounted to an estimated 250 000 tons. The traces of metallurgic activities were found in, for example, Kleszczewko [SCHINDLER 1940].

Especially well developed was metallurgy of other metals (bronze, silver, gold) and horn and amber handicrafts were also known [WOŁĄGIEWICZ 1981].



Fig. 1. Fragmentary picture of cultivated plants (1st c. BC/1st-4th c. AD); after Wielowiejski [1981], modified
 x – number of specimens, ⊙ – one kind of wheat (rye), I/II – 1st c. BC/2nd c. AD, ○ – No of objects

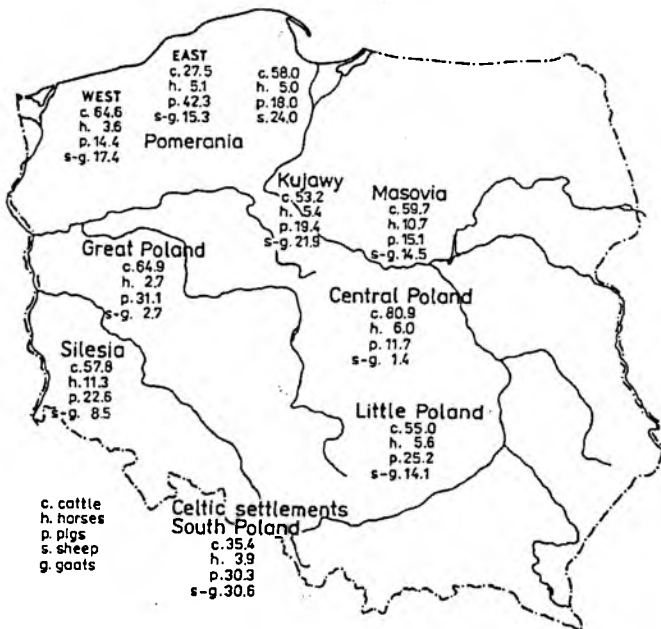


Fig. 2. Structure of animal bones in 1 c. BC and in Roman Period, regionally (after Wielowiejski [1981], modified)

In Pruszcz Gdański three lime-kilns were found, lime being used there for building purposes, smelting iron stone, and for tanning. The lime-kilns were used even for grain drying [PIETRZAK 1970].

As early as in 1st century AD Pruszcz Gdański was known as a trade centre of the region and its fame grew in 2nd c. and at the beginning of 3rd century thanks mainly to the settlement's location near the sea [PRZEWOŻNA 1974]. The amber route was also a boost to the trade of the place.

The information on the region, fragmentary as it is, indicates the East Pomerania, including Pruszcz Gdański, and the western part of the Baltic Region were similar in their natural environments, and consequently, in their economic structures as well. A claim may be ventured that the dietary habits were also similar in these two regions, although social life and local customs might have modelled them considerably. No information to that effect is available yet, though.

Anthropologically, women from Pruszcz Gdański are known to have been typical for the autochthonic population of Balts, while men there had traces characteristic for Goths-German tribes that penetrated also the East Pomerania Region [GŁADYKOWSKA-RZECZYCKA 1981].

The kind of diet is usually archeologically determined by examining grave goods, which, however, need not reflect the real type of nourishment.

Our objective is to reconstruct the diet of prehistoric populations following some analysis of elements in the human skeletal remains. We do not intend to determine components of the individual diet. Instead, we are trying to find out

what elements constituted the predominating diet in a given population [SMRČKA et al. 1988].

Reconstruction of a given diet is scientifically valid only when one analyzes those diet elements whose environmentally provoked concentration changes are minimal and can be mathematically expressed. Consequently, we have chosen zinc and strontium, the elements whose concentration in the buried skeleton is influenced by the soil composition to the minimal degree only.

A standard method of sampling we employed included the following steps: a compact bone sampling was taken from the proximal part of the femur shaft opposite the lesser trochanter; another sample was obtained from the femoral head. The degree of sample contamination was measured by means of Ti [JAMBOR 1988].

The chemical analysis was made by emission spectroscopy, flame spectroscopy for alkaline elements, and arc spectroscopy for heavy metals. Determination of elements in the individual bone was done by methods of statistics applied to the whole burial ground material.

Collaboration with anthropologists and archeologists is essential when evaluating the results. The age and sex of every skeleton the samples were taken from must be determined. It is also necessary to know the layout of the skeleton and the location of any metallic objects on and near the skeleton. Any remains of foodstuffs present in the grave must be also sampled and chemically analyzed.

The comparison of concentration of elements in bones with that in the surrounding soil is vital to diet reconstruction. We therefore recommend the archeologists should take soil samples

from every grave, one sample coming from the soil adjacent to the bone, the other one being from the soil 25 cm away from the skeleton. It is convenient to take soil samples from the burial ground at one place at least for vertical stratification of the composition of elements.

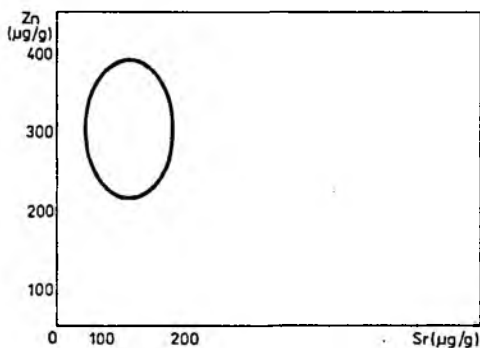


Fig. 3. Zinc and strontium in the skeletons from Pruszcz Gdański

182 samples of 48 skeletons were taken from the burial ground in Pruszcz Gdański.

The comparison of the graphs in Fig. 3 indicates the diet of the population buried there had in it prevalent foodstuffs of high proportion of zinc (including meat proteins) and was of low strontium content (coming from vegetable tissue). Undoubtedly, this group of the population was inclined towards a meat diet mainly.

For a comparative study, 478 bone samples were taken of 163 skeletons from burial grounds in Central Europe: Abraham, Sládkovičovo and Gerulata II, from 1st to 2nd centuries, deposited at the Prague National Museum; Gerulata I and III, from 3rd to 5th centuries, deposited at the Slovak National Museum; Niemberg and Erfurt, from 3rd to 4th centuries, deposited at Landesmuseum

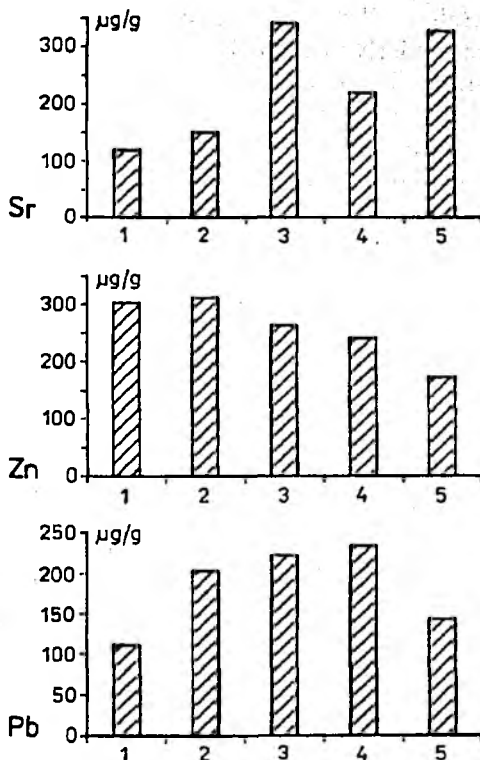


Fig. 4. The type of element composition: Sr, Zn and Pb in the skeletons from Central Europe cemeteries 1 – Pruszcz Gdański, 2 – Niemberg, 3 – Gerulata I, 4 – Gerulata III, 5 – Madaras

für Vorgeschichte in Halle; Madaras-Halmok, from 3rd to 5th centuries, Szeged, Hungary (Fig. 4); and of 36 skeletons from Wadi Qitna, Egyptian Nubia, from 1st to 5th centuries, deposited at the Náprstek Museum in Prague.

The type of composition of elements with the predominant concentration of zinc is very similar to that found out in Germanic cemeteries along the frontier of the Roman Empire (Sládkovičovo, Niemberg, etc., [SMRČKA et al. 1988]).

This aspect of the diet there is very much in line with Caesar's comments on the eating habits of Germanic tribes

(Bell, Gall 6) saying that: "they are not particularly interested in farming and that their diet consisted mostly of milk, cheese and meat".

There is no doubt the conclusions drawn from such a fragmentary information must be taken with caution. We do not know all the elements that were present in the environment of people and tribes presented in the paper. We know only that agriculture, husbandry, handicraft as a form of industry, metallurgy and trade were all present in the economy of the inhabitants of Pruszcz Gdański in the Roman Period.

Our present knowledge about the examined groups allows us to claim only that their diet was very similar. What caused this similarity is difficult to say: similar natural environment, biological structure or customs?. It seems all of these factors were vital, yet the most important one among might have been the customs of the population.

References

- AUFDERHEIDE A., C. NEIMAN, D. LORENTZ, E. WITTMERS, J.R. RAPP, 1981, *Lead in bone II: Skeletal - Lead content as an indicator of lifetime lead ingestion and the social correlates in an archaeological populations*, Am. J. Phys. Anthrop., 55, 285-291
- AUFDERHEIDE A., C. ANGEL, J.L. KELLEY, J.O. OUTLAW, A.C. OUTLAW, E. LORENZ, 1985, *Lead in bone III. Prediction of social correlates from skeletal lead content in four colonial American Populations*, Am. J. Phys. Anthrop., 66, 353-361
- AUFDERHEIDE A., 1989, *Chemical analysis of skeletal remains*, [in:] Y.M. Iscan and K.A.R. Kennedy (eds.), *Reconstruction of life from the skeleton* (ed. Alan R. Liss), New York: Inc.
- BÜLOW K., 1949, *Entstehung der alluvialen Eisener - lagerstätten Mecklenburg*, Archiv für Lagerstättenforschung, Berlin
- ERNST F.J., 1966, *Die vorgeschichtliche Eisenerzeugung, Mitteilungen des Bezirksfachausses für Uhr - und Frugeschichte*, Neubrandenburg
- GLADYKOWSKA-RZECZYCKA J.J., 1981, *Anthropological structure of the Wielbark (Wielbark) culture population*, [in:] *Problemy kultury wielbarskiej (The problems of the Wielbark Culture)*, Słupsk, 163-181 (in Polish)
- GLĄB H., K. SZOSTEK, 1993, *The heavy metal content of teeth in the Pomeranian hunters of the South Spitsbergen in the 18th century*, [in:] *Man in time and space* (ed. J.J. Gładkowska-Rzeczycka), Gdańsk, 416-420 (in Polish)
- JAMBOR J., 1988, *Changes in bones of prehistoric populations caused by environmental influence*, Anthropologie, 26, 55-60
- JAMBOR J., V. SMRČKA, 1993, *Tin in human bones*, Przegł. Antrop., 56, 151-156
- KLICHOWSKA M., 1970, *Flora from Pruszcz Gdański (Roman Period)*, Pomerania Antiqua, 2, 283-286, (in Polish)
- PIETRZAK M., 1970, *Lime-kilns from the older Roman Period at Pruszcz Gdański*, Gdańsk district, Pomerania Antiqua, 2, 267-282
- PRZEWOŻNA K., 1970, *Roman imports in East Pomerania*, Pomerania Antiqua, 2, 75-100, (in Polish)
- PRZEWOŻNA K., 1971, *Settlements of the Late La Tène and Roman Period influence in East Pomorania*, Pomorania Antiqua, 3, 163-277, (in Polish)
- PRZEWOŻNA K., 1974, *Die Structur und die Besiedlungswandlungen der südöstlichen Zone der Ostseeküste um den Ausgang des Altertums*, Poznańskie Towarzystwo Naukowe, 8, 3-196
- SCHINDLER R., 1940, *Germanische Siedlungsfunde am Danziger Höhenrand, Burgundischer Eisenschmelzplatz in Klein-Kleschkau (Rużyny)*, Gothiskandza, 2, 44-55
- SMRČKA V., J. JAMBOR, M. SALAŚ, 1988, *Diet in the 1-2nd centuries along the Northern border of the Roman Empire (a reconstruction on the basis of an analysis of chemical elements found in skeletal remains)*, Anthropologie, 26, 1, 39-54
- SMRČKA V., J. JAMBOR, 1993, *Importance of chemical elements in human skeletal remains*

- in the study of prehistoric populations*, [in:] *Man in Time and Space* (ed. J.J. Gładyskowska-Rzeczycka), Gdańsk, 342–346, (in Polish)
- WALDRON H.A., 1981, *Postmortem absorption of lead by the skeleton*, *Am. J. Phys. Anthropol.*, 55, 105–111
- WALDRON A., 1994, *Counting the dead, The epidemiology of skeletal populations*, John Wiley and Sons, Chichester
- WIELOWIEJSKI J., 1981, *Production*, [in:] *Prahistoria of Polish Lands. La Tène Period and Roman Period* (ed. J. Wielowiejski), Ossolineum, Wrocław, 5, 314–334, (in Polish)
- WOLAĞIEWICZ R., 1981, *Economic bases of the Wielbar culture population*, [in:] *Prahistoria of the Polish Lands. Late La Tène Period and Roman Period* (ed. J. Wielowiejski), Ossolineum, Wrocław, 5, 135–191, (in Polish)

Streszczenie

Odtworzenie sposobu odżywiania ludności z Pruszcza Gdańskiego, z okresu rzymskiego (I–IV w. n.e.)

Sposób odżywiania, niewątpliwie wpływający na rozwój biologiczny człowieka, zarówno współcześnie jak i w minionych wiekach należy do jednych z bardziej intrygujących zagadnień w antropologii. W artykule przedstawiono, w oparciu o specjalistyczne badania archeologiczne, antropologiczne, paleozoologiczne, palinologiczne i chemiczne próbę odtworzenia diety ludności kultury wielbarskiej z okresu rzymskiego, z Pruszcza Gdańskiego. Źródła archeologiczne wykazały, że jest to jeden z ciekawszych obiektów. Położony blisko morza obejmował osadę, w której wyodrębniono część mieszkalną i część gospodarczą, oraz co najmniej trzy cmentarzyska. Rysunki 1 i 2 pozwalają zorientować się i porównać charakter upraw oraz hodowli na obszarze Polski w tym okresie. Z badań wynika, że strukturą gospodarczą Pomorze Wschodnie, a więc i Pruszcz Gdański, nawiązują do struktur zachodnich terenów leżących nad Bałtykiem. Badania antropologiczne wykazały, że kobiety posiadają cechy typowe dla autochtonicznego podłoża bałtyjskiego natomiast mężczyźni – cechy występujące również u plemion germańskich. Badania chemiczne dowodzą, że w diecie ludności z Pruszcza Gdańskiego przeważało białko pochodzenia zwierzęcego, podobnie jak u ludności pogranicza imperium rzymskiego. Trudno ocenić jaki czynnik wpływał w decydujący sposób na dietę tej ludności: środowisko naturalne w szerokim znaczeniu tego słowa czy zwyczaj; wydaje się, że zwyczaj.