

**PALEODEMOGRAPHY AND POPULATION BIOLOGY STUDIES RELATING
TO THE MARVELE BURIAL GROUND
(2nd - 7th CENTURIES AD)**

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Abstract

Paleodemographic analysis was performed in connection with the Marvele burial ground (the largest from the 1st millennium AD) in Central Lithuania, in a search for peculiarities in population biological status in three time periods (OIA2 - 150-300 AD, OIA3 - 300-450 AD and MIA - 450-600 AD). Certain parallels were found between cultural orientation and demographic indices. In the earliest phase, the population of Marvele was the largest, and grave inventories indicated that it had close connections with its southern neighbours. In the next phase, there were definite declines in population number and indices of fertility and mortality; an intensification of contacts with Eastern Balts was characteristic for the period. In the latest phase of inhumations, the demographic indices were improved, but mainly due to the rise in male life expectancy; for this period, the immigration of Eastern Balts took place, as suggested by demographic structure of the population.

Key words: Paleodemography, Iron Age, Lithuania.

Introduction

On the amber coast, at the north-east end of the known world, Tacitus localized mysterious people, *Aestiorum gentes*. He attributed this population to the great community of barbaric tribes, *Germania libera*, though he clearly distinguished the *Aestii* on the basis of their non-Germanic language. This area was of interest to the Roman empire as a source of amber, and regular trade routes were established between the Roman provinces in Central Europe and the South-East Baltic area. Although the main interests of the Romans were concentrated on Semba peninsula (today's Kaliningrad district), as the principal source of amber, regions to the east were of importance as the deep hinterland of the amber trade route (NOWAKOWSKI, 1996).

Archaeological investigations at the Marvele burial ground, located in Central Lithuania, in the territory of today's Kaunas city, were started in 1991 by the Department of Archaeology, University of Vilnius (contractors A. ASTRAUSKAS and M. BERTAŠIUS). Over 1,000 graves have so far been unearthed, making this burial ground

the largest cemetery of the period, extending over a 1,000-year time span (from the 2nd to the 11th-12th centuries). Such a large complex with broad chronology affords a unique possibility to trace cultural and biological processes over a lengthy period.

The Marvele burial ground embraces the Old Iron Age (OIA) or Roman period (1st-4th centuries), the Middle Iron Age (MIA) or Migration period (5th-7th centuries), and the Late Iron Age (LIA) or Early Medieval period. In the OIA, people of several Baltic cultures inhabited Lithuania, one of these being the Central Lithuanian Flat Burial Culture. In general, the cultures of the area were distinct from those of the Roman provinces and the barbaric 'intermediates' of the amber route, and survived periods of rise and decline. They were never isolated from the surrounding world, experiencing feedback interactions with others. During the earliest period, OIA1 (B1-C1a, 70-220 AD), complex burial goods characteristic of the West Balts in general prevailed (ASTRAUSKAS, 1996). By the end of this period, new types of artifacts had appeared, and most older cemeteries had been abandoned. In the next period, OIA2 (C1a-C2, 150-300 AD), certain cultural changes took place, as new cemeteries, Marvele among them, were established, and neighbouring southern regions such as Mozuria and Sudovia strongly influenced the material culture. During the following period, OIA3 (C3-D, 300-450 AD), contacts with East Lithuania intensified, as indicated by new artifacts as well as slightly different funerary traditions. The fourth stage of inhumations corresponded to MIA (E, 450-600 AD) and reflected absolutely different cultural and social realities; it was marked by a new complex of artifacts, and by wealthy burials containing silver implements (ASTRAUSKAS, 1996). These changes had to be related to general processes throughout Europe, the growth of the influence of the Ostrogothic state in Pontic region and the conquests of the Huns (ŠIMENAS, 1992). Craniological data reveal that distinct biological changes took place in parallel with the cultural shift: hypermorphic dolichocranic people with high narrow faces were replaced by an extremely hypermorphic dolichocranic population with high broad faces (ČESNYS, 1990), a more robust skeleton and a taller stature (JANKAUSKAS and BARKUS, 1994). The LIA period in the Marvele burial ground, as in Lithuania in general, was characterized by the spread of cremation customs, often associated with nearby ritual horse burials, and the intensification of peri-Baltic trade connections, especially with Scandinavia (BERTAŠIUS, 1996).

The purpose of the present paper is to discuss possible anthropological (cultural and physical) parallels of this burial ground, to examine whether there was any basis explainable in biological terms for the cultural changes in Marvele. The discussion will be limited to paleodemographic and some paleopathologic data, as traditional craniometric and odontologic traits systems, though provisionally discussed elsewhere (JANKAUSKAS and BARKUS, 1996), should be revised and updated.

Materials and methods

To date, only skeletal materials of inhumations (OIA and MIA) have been investigated. The majority of the bones were extremely badly preserved, due to the unfavourable soil conditions. The sex and age of each individual were estimated by using conventional methods (SZILVASSY, 1988; SJØVOLD, 1988; GARMUS and JANKAUSKAS, 1993). In total, sex and/or age were estimated for 514 individuals. Ordinary life tables (ACSÁDI and NEMESKÉRI, 1970; UBELAKER, 1989) were calculated for three chronological periods (OIA2, OIA3 and MIA).

Results and discussion

Life tables for each chronological time period are presented in Table 1 (total subsamples), Table 2 (males) and Table 3 (females).

Table 1. Life tables of subadults and adults from three Marvele burial ground chronological periods.

x	D_x	d_x	l_x	q_x	L_x	T_x	e_x^0
Old Iron Age 2 (150-300 AD)							
0	15	5.64	100.00	0.06	97.18	2723.12	27.23
1-4	32	12.03	94.36	0.13	441.73	2625.94	27.83
5-9	24	9.02	82.33	0.11	389.10	2184.21	26.53
10-14	12	4.51	73.31	0.06	355.26	1795.11	24.49
15-19	8	3.01	68.80	0.04	336.47	1439.85	20.93
20-29	46.5	17.48	65.79	0.27	570.49	1103.38	16.77
30-39	67	25.19	48.31	0.52	357.14	532.89	11.03
40-49	45.5	17.11	23.12	0.74	145.68	175.75	7.60
50+	16	6.02	6.02	1.00	30.08	30.08	5.00
Total	266	100.00		2723.12			
Old Iron Age 3 (300-450 AD)							
0	14	10.85	100.00	0.11	94.57	2411.43	24.11
1-4	17	13.18	9.15	0.15	412.79	2316.86	25.99
5-9	16	12.40	75.97	0.16	348.84	1904.07	25.06
10-14	6	4.65	63.57	0.07	306.20	1555.23	24.47
15-19	2.5	1.94	58.91	0.03	289.73	1249.03	21.20
20-29	23	17.83	56.98	0.31	480.62	959.30	16.84
30-39	23	17.83	39.15	0.46	302.33	478.68	12.23
40-49	18.5	14.34	21.32	0.67	141.47	176.36	8.27
50+	9	6.98	6.98	1.00	34.88	34.88	5.00
Total	129	100.00		2411.43			
Middle Iron Age (450-600 AD)							
0	1	0.84	100.00	0.01	99.58	2942.68	29.43
1-4	9	7.53	99.16	0.08	476.99	2843.10	28.67
5-9	16	13.39	91.63	0.15	424.69	2366.11	25.82
10-14	6	5.02	78.24	0.06	378.66	1941.42	24.81
15-19	3	2.51	73.22	0.03	359.83	1562.76	21.34
20-29	23	19.25	70.71	0.27	610.88	1202.93	17.01
30-39	28.5	23.85	51.46	0.46	395.40	592.05	11.50
40-49	26	21.76	27.62	0.79	167.36	196.65	7.12
50+	7	5.86	5.86	1.00	29.29	29.29	5.00
Total	119.5	100.00		2942.68			

The survivorship rate (l_x) and, correspondingly, the probability of death (q_x) for all subsamples shows that the mortality and probability of death in young age groups were highest in OIA3, i.e. higher than in the earlier period (OIA2) and substantially higher than in the later MIA stage. For adult males, the same regularities were established, but for females, quite unexpectedly, a more complicated situation was found: female mortality at a young (reproductive) age was highest in MIA, exceeding that in OIA2 and even OIA3. As a result, the average life expectancy fluctuated for pooled samples (a decrease in e_0^0 from OIA2 to OIA3, and a substantial increase from OIA3 to MIA), but male and female subsamples exhibited opposite tendencies: the male e_{20}^0 rose slightly during all chronological periods, whereas the female e_{20}^0 decreased. As a result, sex differences in life expectancy increased from 2.13 years in OIA2 to 6.53 years in MIA.

Table 2. Life tables of adult males from three Marvele burial ground chronological periods.

x	D_x	d_x	l_x	q_x	L_x	T_x	e_x^0
Old Iron Age 2 (150-300 AD)							
20-24	6	6.67	100.00	0.07	483.33	1783.33	17.83
25-29	12	13.33	93.33	0.14	433.33	1300.00	13.93
30-34	14	15.56	80.00	0.19	361.11	866.67	10.83
35-39	19	21.11	64.44	0.33	269.44	505.56	7.84
40-44	25	27.78	43.33	0.64	147.22	236.11	5.45
45-49	7	7.78	15.56	0.50	58.33	88.89	5.71
50-54	5	5.56	7.78	0.71	25.00	30.56	3.93
55+	2	2.22	2.22	1.00	5.56	5.56	2.50
Total	90	100.00		1783.33			
Old Iron Age 3 (300-450 AD)							
20-24	6	14.29	100.00	0.14	464.29	1785.71	17.86
25-29	6	14.29	85.71	0.17	392.86	1321.43	15.42
30-34	6	14.29	71.43	0.20	321.43	928.57	13.00
35-39	3	7.14	57.14	0.13	267.86	607.14	10.63
40-44	9	21.43	50.00	0.43	196.43	339.29	6.79
45-49	6	14.29	28.57	0.50	107.14	142.86	5.00
50-54	6	14.29	14.29	1.00	35.71	35.71	2.50
55+	0	0.00	0.00	0.00	0.00	0.00	0.00
Total	42	100.00		1785.71			
Middle Iron Age (450-600 AD)							
20-24	2	4.26	100.00	0.04	489.36	1994.68	19.95
25-29	5	10.64	95.74	0.11	452.13	1505.32	15.72
30-34	6	12.77	85.11	0.15	393.62	1053.19	12.38
35-39	9	19.15	72.34	0.26	313.83	659.57	9.12
40-44	11	23.40	53.19	0.44	207.45	345.74	6.50
45-49	9	19.15	29.79	0.64	101.06	138.30	4.64
50-54	4	8.51	10.64	0.80	31.91	37.23	3.50
55+	1	2.13	2.13	1.00	5.32	5.32	2.50
Total	47	100.00		1994.68			

An analysis of 'synthetic' demographic indices (Table 4) provides a possibility for a clearer insight into the processes taking place in the Marvele burial ground during three chronological periods of inhumations. First of all, a substantial increase in crude mortality in OIA3 is evident. As a consequence, although the potential reproductive rate remained high, the proportion of children dying in the pre-reproductive age was also

extremely high (41.1%), the population reproduction decreased, and the population size could be estimated as being twice as small as in the previous period. In other terms, we have evidence of a certain demographic crisis. The principal fertility and mortality indices started to improve only in MIA: the mortality rate decreased (mostly due to the higher life expectancy in males), and the population reproduction rate rose.

Table 3. Life tables of adult females from three Marvele burial ground chronological periods.

x	D _x	d _x	l _x	q _x	L _x	T _x	e ⁰ _x
Old Iron Age 2 (150-300 AD)							
20-24	7	8.14	100.00	0.08	479.65	1569.77	15.70
25-29	21	24.42	91.86	0.27	398.26	1090.12	11.87
30-34	21	24.42	67.44	0.36	276.16	691.86	10.26
35-39	12	13.95	43.02	0.32	180.23	415.70	9.66
40-44	8	9.30	29.07	0.32	122.09	235.47	8.10
45-49	8	9.30	19.77	0.47	75.58	113.37	5.74
50-54	7	8.14	10.47	0.78	31.98	37.79	3.61
55+	2	2.33	2.33	1.00	5.81	5.81	2.50
Total	86	100.00		1569.77			
Old Iron Age 3 (300-450 AD)							
20-24	5	14.29	100.00	0.14	464.29	1478.57	14.79
25-29	9	25.71	85.71	0.30	364.29	1014.29	11.83
30-34	7	20.00	60.00	0.33	250.00	650.00	10.83
35-39	4	11.43	40.00	0.29	171.43	400.00	10.00
40-44	4	11.43	28.57	0.40	114.29	228.57	8.00
45-49	2	5.71	17.14	0.33	71.43	114.29	6.67
50-54	3	8.57	11.43	0.75	35.71	42.86	3.75
55+	1	2.86	2.86	1.00	7.14	7.14	2.50
Total	35	100.00		1478.57			
Middle Iron Age (450-600 AD)							
20-24	7	18.42	100.00	0.18	453.95	1342.11	13.42
25-29	7	18.42	81.58	0.23	361.84	888.16	10.89
30-34	11	28.95	63.16	0.46	243.42	526.32	8.33
35-39	5	13.16	34.21	0.38	138.16	282.89	8.27
40-44	4	10.53	21.05	0.50	78.95	144.74	6.88
45-49	2	5.26	10.53	0.50	39.47	65.79	6.25
50-54	1	2.63	5.26	0.50	19.74	26.32	5.00
55+	1	2.63	2.63	1.00	6.58	6.58	2.50
Total	38	100.00		1342.11			

The above demographic data allow the hypothesis of archaeological and biological parallels. Diminishing contacts with southern regions and the intensification of the Eastern influence in OIA3 were followed by a decrease in population number. This could suggest the importance of southern neighbours as trade mediators in maintaining Marvele as a local trade centre. In MIA, this weakened centre received a 'second breath', but, due to the mechanical immigration of new people from the East, areas traditionally inhabited by the Eastern Balts, as all archaeological and anthropological data show. This cultural and biological change was gradual, as inhumation tradition in the same burial ground continued, although not always smoothly and peacefully: archaeological data suggest the robbery of OIA3 graves (ASTRAUSKAS, personal comm.). Thus, although culturally related, these newcomers were distinct biologically - they were phenotypically related to other MIA hyperrobust populations. Moreover,

some paleopathological data suggest genetic relations (the incidence of ankylosing spondylitis, a disease with a certain genetic predisposition, non-existent in OIA, was surprisingly high in some MIA Central Lithuanian populations, Marvele being no exception - 5 cases of MARIE-STRÜMPPEL-BECHTEREW disease were identified, all from MIA).

In this way, some parallels were established between cultural and biological data in one Central Lithuanian 1st millennium burial ground. A discussion of the causes (did cultural changes precede demographic shifts or vice versa?) must remain for the future.

Table 4. Calculated demographic indices of three chronological periods in the Marvele burial ground.

Index	OIA2	IA3	MIA
Crude mortality rate, M	36.72	41.48	33.98
Potential gross reproductive rate, R_{0ot}^1	0.793	0.803	0.787
Net reproduction rate, R_0^1 :			
If $U_c = 6$	1.637	1.419	1.728
If $U_c = 8$	2.182	1.892	2.304
Population size ²	63.29	35.13	38.45
Population size ³	48.29	20.73	23.45

¹ HENNEBERG, 1976

² ACSÁDI and NEMESKÉRI, 1970

³ UBELAKER, 1989

Note: U_c = completed fertility (cumulative number of births per woman surviving the reproductive period).

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