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Secular variations in the body stature of the inhabitants of Latvia (7th millennium BC – 20th c. AD)

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The aim of the study was to characterize secular changes in the stature of the inhabitants of Latvia over the past nine millennia. **Materials and methods**. Reconstruction of human stature from bone measurements of 2357 individuals was performed. Alongside traditional methods, formulae developed by the author have also been applied. These estimates are compared with the mean body height of living persons from adult populations of Latvia. **Results and discussion**. The mean stature of the inhabitants of Latvia during the period from the Mesolithic (7th mill. BC) up to present day decreased and increased again several times. A pronounced reduction was observed in the mid 5th millennium BC, coinciding with the transitional phase from the Mesolithic to the Neolithic, in the Bronze Age and in the period from the 13th to the mid 19th century. A pronounced increase in stature were observed for the Corded Ware Culture people of the Late Neolithic, in the Iron Age (5th–12th century) and for the contemporary population. At least from the Iron Age there has been a geographical gradient of stature: it decreases from west to east. This geographical gradient is determined by differences in genetic, climatic, geographical and economic conditions between western and eastern Latvia. **Conclusion**. Assessing the course of changes in stature, it is concluded that for males the range of fluctuations is greater compared with females, confirming the view that the female organism is more resistant to the effect of adverse conditions.

Key words: stature, stature reconstruction, secular variations, Latvia

INTRODUCTION

In anthropological research, there is a long record of discussion on the issue of human secular and biological variation in time and space. Particular attention has been given to the characterization of physical development of ancient populations in relation to various environmental factors: climatic-geographical, social, economic, etc. The accumulated factual material on the ecology of human groups in various chronological periods and at present provides evidence of environmental influence on human biological data. Determination of the stature of past inhabitants is important from several aspects: 1) such data provide additional information concerning the history of tribes and peoples, as well as help to assess human physical development in various chronological periods and better understand the growth and development processes in the present-day inhabitants; 2) changes in human stature of the inhabitants of a particular area over an extended period provide evidence for assessing human secular variation, microevolutionary processes and the factors behind them; 3) stature is a synthetic index of welfare.

Human stature is dependent on the processes of growth and development of the whole organism (1). Stature is characterised by a variation related to sex and age, intrapopulation (individual) and secular variations. Among all the factors affecting stature and its changes, two groups can be distinguished: 1) endogenic (congenital) and 2) exogenic – the aggregate of environmental conditions: ecological, social, economic, climatic and other factors. The human growth process involves a complex interaction between these two groups of factors (2).

An individual's maximum attainable stature is strictly determined genetically. However, nobody is born with a stature predetermined exactly in millimetres or centimetres. The individual only inherits a certain norm of response, *i.e.* the stature that the individual will reach is dependent on the degree to which the environment promotes attainment of the (genetic) maximum limit. In the course of growth and development, the individual adjusts biologically to environmental conditions (3). The adaptive potential is largely determined by skeletal plasticity, one of the basic characteristics of the skeletal system. Bone shows phenotypic variation in relation to the influence of environmental factors and can retain its form for a

prolonged period as a reaction. Such changes take place most rapidly in childhood, but the end result is observable in adult individuals (4).

The individual's genotype mainly determines not an increase or reduction in stature, but rather the organism's individual sensitivity to environmental factors. Stress can be caused by various factors: climatic fluctuations, ecological conditions, adaptation to new geographical and economic conditions, the quality and quantity of nutrition, socio-economic relationships, etc. If such stress is not overcome, the individual will die. The surviving section of the inhabitants will reflect the standard of living during the period of growth of that generation (5).

In studying palaeoanthropological material, the so-called 'osteological paradox' may be encountered, where an increase in pathologies and a reduction in the mean stature of the population may not be connected with deterioration in living conditions. Quite the opposite, this can indicate improved living conditions and a higher resistance to diseases, so that those individuals also survive who would have died under different conditions (6).

Recent decades have seen the development of methods of osteological study and reconstruction. There are published studies on human stature in the Baltic and in Europe during various periods in history. However, general works, for example, on Stone Age Europe (7, 8), do not include information on the inhabitants of Latvia. Accordingly, there was a need to make available for use in research the data on human stature in Latvia during all historical periods, particularly with regard to the Stone Age and Bronze Age. The material at our disposal also constitutes a significant contribution to the study of human stature, secular changes in stature and its interpretation at the European scale.

The aim of the study was, based on the reconstructed human stature data, to characterize secular changes in the stature of the inhabitants of Latvia over the past nine millennia.

MATERIALS AND METHODS

The study has been conducted using the palaeoanthropological material in the collections of the Anthropological Research Laboratory of the Latvian Institute of History of the University of Latvia. Sixty series of osteological material have been studied from the territory of Latvia, with a chronological span from the Stone Age (7th mill. BC) up to the 18th century AD.

Based on the accepted Latvian archaeological periodisation, the material from each historical age was analysed separately: Stone Age, Bronze Age, Iron Age and the 13th–18th century. A total of 2357 adult skeletons were studied, for which body stature could be reconstructed.

The main criteria for sex determination were: the specific development of osteal relief on the skull, the form of the hipbone and the general size of long bones (9, 10). Adults were aged according to obliteration of cranial sutures, preservation of surface joints of long bones, pubic symphysis and some other additional parameters (11–13).

For osteometric measurements, skeletal material was used from the adult individuals where the growth process of the long bones of the limbs was completed and which did not show pathologies deforming the bone. The programme of measurements included osteometric measurements required for reconstructing body stature. The long bones of both sides of the skeleton were measured, and the mean figure was calculated for each variable. In cases where the respective bone from only one side of the skeleton could be measured, the value obtained was used as the mean for both sides of the body, without any correction for possible asymmetry.

Virtually all of the stature reconstruction techniques have been developed on the basis of anthropological material from modern-day (19th–20th century) inhabitants. This gives rise to the question: which of these techniques should be chosen, and can they be used for a reliable reconstruction of the stature of the past inhabitants that lived as long as several millennia ago? Since the objective criteria for choosing the method of reconstruction have not been formulated right up to the present day, in palaeoanthropological studies human stature has been calculated using various methods. In order to obtain maximally objective data on the stature of the past inhabitants of Latvia, new formulae were developed (14), based not on present-day material, but on palaeoanthropological material from Latvia, dating from various historical periods:

Males	Females
$2.476 \times \text{Hum1} + 89.36$	$2.210 \times \text{Hum1} + 90.35$
$3.037 \times \text{Rad1} + 95.45$	$2.572 \times \text{Rad1} + 99.38$
$2.681 \times \text{Uln1} + 98.41$	$2.595 \times \text{Uln1} + 93.34$
$1.535 \times \text{Fem1} + 101.40$	$1.387 \times \text{Fem1} + 99.32$
$1.854 \times \text{Tib1} + 102.10$	$1.639 \times \text{Tib1} + 101.50,$

where

Hum1 – maximum length of the humerus, Rad1 – maximum length of the radius, Uln1 – maximum length of the ulna, Fem1 – maximum length of the femur, Tib1 – length of the tibia; all measurements in cm.

To enable a better evaluation of the body stature data from Latvia in a wider context and so that other researchers can make use of them, stature has been also reconstructed for each individual using the formulae proposed by other authors (15, 16).

The stature data for adult individuals, calculated from bone dimensions, represent the maximum stature attained during the lifetime. This is important in cases where the stature data for past inhabitants

are compared with the stature data for modern-day inhabitants, obtained by direct anthropological measurement and dependent on the age of the individuals under study. Thus, data on the stature of army service recruits of the second half of the 19th century and the first half of the 20th century in Latvia (aged 18–22) most likely do not reflect the maximum stature attained by males at this time (17, 18).

Traditional techniques of data processing were applied in the study: for each chronological period (male and female groups separately) the number of individuals (N) was determined, the arithmetic mean for the variable was calculated (M), along with the mean deviation m(M) and standard deviation (S).

The statistical significance of differences in mean stature between different chronological periods or different osteological series was assessed by means of the Student's t test and the F statistics (ANOVA). The results were considered statistically significant if $P < 0.05$ or lower.

RESULTS AND DISCUSSION

The data brought together in this study on the stature of the inhabitants of Latvia over the past nine millennia permit the main trends of change in human stature to be determined. The results obtained indicate that the stature of the inhabitants of Latvia has changed several times in the period from the Middle Mesolithic (7th mill. BC) up to the present day (Tables 1, 2).

Since we do not have any data on the stature of the inhabitants of Latvia in the Late Palaeolithic, the point of reference is the stature of Middle Mesolithic males (Zvejnieki cemetery). The data obtained indicate that the mean stature of three individuals is 171.86 ± 0.84 cm. Of course, the small number of individuals sheds some doubt on the representativity of these data. However, in view of the comparative material from adjacent areas (174–175 cm in Karelia; 172–174 cm in Ukraine) it seems that the stature of Middle Mesolithic males in Latvia too was certainly taller than 171 cm.

In the Late Mesolithic (early 5th mill. BC), the mean male stature is slightly lower compared with the preceding period (Table 2), although this difference is not statistically significant on account of the small sample of individuals from the Middle Mesolithic. In morphological terms, this reduction in stature occurs through the reduction of leg length. The females of the Late Mesolithic are characterized by a moderately tall stature (156.00 ± 0.31 cm). In terms of mean stature data, the Late Mesolithic inhabitants of Latvia can be grouped within the Eastern European Mesolithic (Serbia, Ukraine, Karelia). In the literature, one comes across data in-

Table 1. **Reconstructed stature of inhabitants from Latvia (in cm)**

Chronological period, date	Sex	N	Stature Reconstruction Method					
			Latvian (2003)		Trotter & Gleser (1952)		Sjövold (1990)	
			M	S	M	S	M	S
Middle Mesolithic	M	3	171.86	1.45	172.88	1.94	172.47	1.99
(8240–7730 BP)	F	–	–	–	–	–	–	–
Late Mesolithic	M	14	171.48	2.59	172.63	3.68	172.25	4.68
(6900–6500 BP)	F	6	156.00	1.57	157.49	3.36	158.23	3.00
Transition M/N	M	5	164.03	2.24	162.45	2.28	159.25	3.45
(6500–6400 BP)	F	7	153.98	1.95	154.32	3.12	153.35	3.65
Early Neolithic	M	20	167.68	1.92	166.87	3.30	165.19	3.63
(6400–5300 BP)	F	–	–	–	–	–	–	–
Middle Neolithic	M	36	168.05	2.80	167.44	3.92	165.86	4.74
(5300–4300 BP)	F	10	156.14	1.80	157.59	3.43	158.17	4.06
Late Neolithic	M	5	172.35	1.90	173.69	2.72	173.69	3.14
(4300–4100 BP)	F	5	156.65	3.27	159.45	5.02	159.88	5.95
Early Bronze Age	M	47	171.36	3.52	171.71	5.10	171.55	6.08
(3300–3100 BP)	F	32	159.01	1.93	162.40	3.40	163.81	3.60
Late Bronze Age	M	11	169.75	3.12	170.44	4.30	169.33	5.19
(2800–2300 BP)	F	1	155.89	–	156.58	–	156.51	–
Iron Age	M	189	173.89	3.50	175.25	4.45	175.60	5.04
(400–1200)	F	96	159.08	3.40	162.23	5.25	163.34	5.93
13th –15th AD	M	750	171.65	3.34	172.40	4.65	172.12	5.67
	F	439	156.88	2.48	158.94	4.29	159.98	4.72
16th–18th AD	M	407	170.07	2.96	170.50	4.09	169.78	5.03
	F	274	156.16	2.52	157.83	4.38	158.85	4.70

dicating a difference in stature between the inhabitants of Western and Eastern Europe. Among the latter, the mean stature, for both males and females, is almost 10 cm greater. This has been explained in terms of regional differences in the way of life, diet and gene flow, existing already since the Late Palaeolithic (8). However, the issue is not so straightforward, since a proportion of the Mesolithic cemeteries of Eastern Europe (Vlasac, Vasilyevka I, III) date from the Early and Middle Mesolithic (9th–7th mill. BC), while most of the Late Mesolithic cemeteries of Western Europe (Skateholm, cemeteries in Denmark and France) date mainly from the middle and end of the 5th mill. BC. Accordingly, the Late Mesolithic body stature data from Scandinavia (Denmark and Sweden) should more properly be compared with the data for the inhabitants during the transitional phase from the Late Mesolithic to the Early Neolithic at the Zvejnieki site (5th mill. BC). At Zvejnieki cemetery, the burials of this period form a very compact group. There is no indication that the people of this time were familiar with pottery manufacture which in Latvia, as in the rest of northeastern Europe, it taken as the criterion distinguishing the Late Mesolithic from the Early Neolithic. Among both males and females, regardless of the small number of individuals available for study, mean stature shows a statistically significant reduction ($P < 0.01$), compared with the Late Mesolithic (by 7.5 cm for males and 2.0 cm for females).

Evidently, the period of the Early Upper Palaeolithic – Late Upper Palaeolithic – Mesolithic sees a gradual reduction in human stature, reaching a maximum around the middle or end of the 5th mill. BC. With regard to Western and Central Europe this can be interpreted in terms of the 'Neolithic Revolution', i.e. the effect of a food production economy, but with regard to Latvia this cannot apply, since the beginnings of agriculture and stock-keeping relate only to the Middle Neolithic (4th mill. BC).

In the Early Neolithic (late 5th – first half of the 4th mill. BC) the males buried at the Zvejnieki site, compared with those of the transitional phase, show a statistically significant ($P < 0.05$) increase in stature (3.7 cm or 2.2%). It is difficult to interpret unequivocally the increase in the mean stature of Early Neolithic males compared with those of the transitional phase, since there is no clear reason why inhabitants of the transitional phase were of a comparatively short stature and of markedly gracile body build.

The mean stature of the Middle Neolithic inhabitants considered to be the Comb Ware Culture people has not changed in comparison with that of the Early Neolithic (Narva Culture). Differences are se-

Table 2. **Main trends in secular variation in stature among the inhabitants of Latvia**

Chronological Period, date	Males			Females		
	M	± cm	± %	M	± cm	± %
Middle Mesolithic (8240–7730 BP)	171.86	–	–	–	–	–
Late Mesolithic (6900–6500 BP)	171.48	–0.38	–0.22	156.00	–	–
Transition M/N (6500–6400 BP)	164.03*	–7.45	–4.50	153.98*	–2.02	–1.31
Early Neolithic (6400–5300 BP)	167.68*	+3.65	+2.22	–	–	–
Middle Neolithic (5300–4300 BP)	168.05	+0.37	+0.22	156.14	–	–
Late Neolithic (4300–4100 BP)	172.35*	+4.30	+2.6	156.65	+0.51	+0.33
Early Bronze Age (3300–3100 BP)	171.36*	–0.99	–0.58	159.01*	+2.36	+1.51
Late Bronze Age (2800–2300 BP)	169.75*	–1.61	–0.95	155.89	–3.12	–2.00
Iron Age (400–1200)	173.89*	+4.14	+2.44	159.08	+3.19	+2.05
13th–5th AD	171.65*	–2.24	–1.30	156.58*	–2.50	–1.60
16th–18th AD	170.07*	–1.58	–0.93	156.16*	–0.42	–0.27
1874–1875	167.63*	–2.44	–1.46	–	–	–
1920–1922	171.47*	+3.84	+2.29	159.84	–	–
1996–1998	177.63*	+6.16	+3.59	167.12*	+7.28	+4.60

* Statistically significant differences ($P < 0.05$ or lower) and ± cm; ± % comparison with previous period

en in the grouping of individuals (males) into stature groups. Thus, in the Middle Neolithic, 45% of males are of moderately tall stature, while 20% are tall (>170 cm) (10% in the Early Neolithic). However, in contrast to the Early Neolithic, in the Middle Neolithic there are also individuals (6%) of moderately short stature (160–163.9 cm). To a certain degree, such individual variation in stature could indicate 1) relatively better living conditions in the Middle Neolithic, promoting the survival of a large proportion of the community and 2) the possibility that different social groups already existed in the Middle Neolithic. Possibly, individuals of a high social status were of taller stature, while those of a lower social status were shorter. The character of the burials themselves shows this indirectly: some are buried in collective graves with rich grave goods (amber, copper artefacts, etc.), and at the same time there are burials without any grave goods. This question requires further detailed study (comparison of physical development data with demographic and palaeopathological data and dietary studies).

The stature of Middle Neolithic women shows a statistically significant increase, compared with the transitional phase from the Late Mesolithic to the Early Neolithic (there is no data for the Early Neolithic), and is the same as that of the Late Mesolithic (which is not the case for males).

Significant changes in human body build have been found in the Late Neolithic. Among males of the Corded Ware and Battle-Axe Culture, stature has increased by 4.3 cm or 2.6% compared with the Middle Neolithic. Comparing the females of these groups, there is also a minor trend of stature increase in the Late Neolithic, which is not statistically significant. The Late Neolithic changes in stature are connected with the circumstance that evidently the Corded Ware Culture people were new arrivals in the territory of Latvia, since such a tall stature and a pronounced robustness of body build were not observed in the previous periods and the changes probably cannot be explained in terms of positive environmental or economic influences, since the subsistence economy of these inhabitants, like those of the preceding chronological periods, was dominated by hunting and fishing (19).

The males of the next chronological period – the Early Bronze Age – buried at Kivutkalns cemetery show a statistically significant decrease in stature compared with the Late Neolithic (crouched burials), while the opposite trend, an increase, is observed for females (Table 2), although this is not a statistically significant difference because of the great individual variation in the Late Neolithic stature. This is the only occasion when the direction of epochal change in the territory of Latvia does not coincide for males and females. To a large degree, this can be explained in terms of the small sample of osteological material for Late Neolithic females.

The males of the Late Bronze Age (at Zvejnieki cemetery) show a further reduced stature, compared with the Early Bronze Age (Table 2). It is thought that both the process of stature reduction and gracilisation of the skeletal system in the territory of Latvia during the Bronze Age is linked to the negative effect of the food production economy, in its initial stages, on human morphological values, corresponding to the results of studies published in the anthropological literature.

The Iron Age (Latvian archaeological periodisation 5th BC – 12th AD) marked an important phase in historical development, when the food production economy developed rapidly and crafts and trade became increasingly important. Along with the rapid economic development, social stratification also occurred. In terms of climatic periodisation, the Iron Age corresponds to the Subatlantic period characterized by short-lived but pronounced fluctuations in moisture regime, solar radiation, etc., which in particular cases acted to promote or hinder economic processes.

Osteological material for the 5th–12th century AD provides a picture of the physical development of Latvia's Iron Age inhabitants. During this period, the territory of Latvia was inhabited by various Baltic groups (Couronians, Semigallians, Selonians and Latgallians) and a Finnic group (Livs). It should be noted that there are no statistically significant differences in stature between the Livs and the Balts.

Overall, the 5th–12th century inhabitants were characterized by a tall stature (mean 173.89 ± 0.25 cm for males, 159.09 ± 0.35 cm for females). In the Iron Age, 90% of males are characterized by a tall or even a very tall stature. Unlike in the Bronze Age, during the Iron Age individuals of moderately short stature (<164 cm) have not been found, and likewise there are comparatively few individuals (2%) of medium stature (164 to 167 cm). This indicates comparatively better living conditions in the Iron Age. To some extent it can be considered that in the Iron Age the inhabitants of Latvia had adapted biologically to a food-producing economic model and that the sufficient food resources provided by the highly developed agriculture and stock-keeping for this period promoted the physical development of the inhabitants.

It has been found that within the territory of Latvia, at least from the Middle Iron Age, there is a geographical gradient of stature, with a statistically significant ($P < 0.01$) decrease from west to east. The tallest stature is found among the inhabitants of western Semigallia, and the shortest among those living in Latgale (175.3 and 173.1 cm for males; 160.9 and 158.4 cm for females). The reasons for this gradient have not been conclusively established. Possibly, the differences can be explained both in terms of human adaptation to environmental conditions, differences in the level of

economic development between these regions and genetic factors.

In the history of Latvia, the 13th–18th century is characterized by radical changes in the political and economic sphere, as well as in material and spiritual culture. At this time, many dramatic events took place in Latvia, such as wars, famines, epidemics, the introduction of serfdom, etc. Thus, it is important to determine what effect the continuous social, biological and psychological stress had on the physical development of the inhabitants.

The body build data for the 13th–18th century inhabitants of Latvia was assessed for each historical region (Kurzeme, Vidzeme, Augšzeme and Zemgale). The data obtained indicate that from the 13th century there was a statistically significant reduction ($P < 0.01$) in the mean stature of the inhabitants across the whole of the territory of Latvia.

In the Iron Age (5th–12th century AD), 89.4% of males had a stature exceeding 170 cm, but in the 13th–15th century this figure was exceeded by only by 68.6% and in the 16th–18th century only by 48.9% of males. Among females, in the 5th–12th century 52.1% were of tall stature (over 159 cm), in the 13th–15th century only 19.1% were of tall stature, and in the 16th–18th century only 9.4% (Table 3).

Table 3. **Distribution of individual stature data (%) according to Martin's class categories for the Latvian 5th–18th c.c. samples**

Stature groups (cm)	5th–12th AD	13th–15th AD	16th–18th AD
Males			
< 163.9	–	1.3	1.7
164–166.9	2.1	4.8	10.7
167–169.9	8.5	25.3	38.7
170–179.9	84.1	67.1	48.6
> 180	5.3	1.5	0.3
Females			
< 152.9	–	5.4	9.8
153–155.9	13.5	28.6	33.4
156–158.9	34.4	46.9	47.4
159–167.9	50.0	19.1	9.4
>168	2.1	–	–

It is important to note that from the 13th century the reduction in stature is seen across the whole territory of Latvia. There may be various reasons behind these negative changes. In the first place, there were changes in the historical conditions in the late 12th and early 13th century, which caused irreversible changes in the life of the indigenous inhabitants of Latvia. The living standard of the inhabitants experienced a further rapid fall with the introduction of serfdom (in the 15th century).

Secondly, mention should be made of the very unfavorable climatic conditions. The preceding period (9th–12th century) had seen a so-called 'climatic optimum', which promoted the development of agriculture and stock-keeping and was one of the factors that permitted the inhabitants to realize their genetic potential, one of the expressions of this being tall mean stature (174–176 cm for males; 159–161 cm for females). From the turn of the 14th century right up to the 19th century, there was a fall in temperature affecting the whole of the Northern Hemisphere. Winters during this period were harsher than at present, spring set in late and during the summers there were frequent weather anomalies (drought and prolonged rains). Because of these climatic changes, as the result of low temperature and increased precipitation, the whole territory of Latvia (particularly the plains) experienced rapid bogging-up of low-lying areas, which reduced the area of agricultural land. The unfavorable climatic conditions led to repeated bad harvests, followed by famine and disease, taking toll of population numbers. With regard to body build, it can be considered that under such conditions there was a degree of selection in favor of individuals of shorter stature and more gracile body build. Thirdly, it is possible that the reduction in stature in the 13th–18th century represents a stage in a global process, since general gracilisation of the human skeletal system and a reduction in mean stature is seen during this period across the whole of Europe. Researchers are not in agreement as to whether these changes should be regarded as human microevolution, with actual genotypical changes, or whether the processes are of an adaptive phenotypical character.

After the 13th century, a very rapid and marked process of reduction in mean stature is seen among the inhabitants of Latvia, both males and females. This affects the whole territory of Latvia and evidently continues right up to the mid 19th century. A more pronounced reduction in stature is seen in the 13th–15th century. During this period, compared with the Iron Age, the stature has been reduced by 1.3% for males and by 1.6% for females. In the 16th–18th century, the reduction in stature in comparison with the 13th–15th century is 0.9% for males and only 0.3% for females. After this, male stature is reduced more rapidly again. Possibly, the mean stature of males recorded in the 1870s is reduced because measurements were taken on military recruits, among which the growth process was possibly not yet completed. Comparison of these data with the Iron Age, when the tallest stature is seen, shows that in the 1870s the male stature was reduced by more than 6 cm.

From the late 19th century, when serfdom was abolished in Latvia and the living conditions of the indigenous population gradually improved, the human stature began to increase (18). This took place especially rapidly under the effect of acceleration in the 20th century. Over the past 60 years, mean male stature has increased by 6.2 cm and that of females by 7.3 cm (20, 21).

Assessing the course of changes in stature among the inhabitants of Latvia, it is concluded that for males the range of fluctuations is greater compared with females, confirming the view expressed in anthropological literature that the female organism is more resistant to the effect of adverse conditions.

Analysis of the stature of the inhabitants of Latvia conducted in this study confirms the results obtained by other researchers regarding secular changes in human stature in Europe from the Stone Age up to the present day.

CONCLUSIONS

1. Assessing the dynamics of stature among the inhabitants of Latvia in the period from the 7th millennium BC up to and including the 20th century, it is concluded that there have been both reductions and subsequent increases in stature.

2. A marked stature reduction was seen in the mid 6th millennium BC, coinciding with the transitional phase from the Mesolithic to the Neolithic, in the Bronze Age (for males) and in the period from the 13th to the mid 19th century. A marked increase in stature is observed among the Corded Ware Culture people of the Late Neolithic, in the Iron Age (5th–12th c. AD) and at present (20th century).

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G. Gerhards

LATVIJOS GYVENTOJØ ÛGIO SVYRAVIMAI VII TÛKSTANTM. PR. KR. – XX A.

Santrauka

Tyrimo tikslas yra apibûdinti Latvijos gyventojø ûgio poslinkius per paskutinius devynis tûkstanèius metø. Rekonstruojant þmoniø ûgá pagal archeologiniø kasinëjimø metu gautà medþiagà (2357 individai), be tradiciniø metodø, taikytos ir paties autoriaus sudarytos formulës. Ðios rekonstrukcijos lygintos su dabartiniø Latvijos suaugusiø gyventojø ûgio vidurkiais.

Nustatyta, kad vidutinis Latvijos gyventojø ûgis nuo mezolito (VII tûkstantm. pr. Kr.) iki ðiø dienø buvo kelis kartus sumaþëjæs ir vëliau vël padidëjæs. Ryðkus ûgio sumaþëjimas buvo stebëtas V tûkstantm. pr. Kr. viduryje, o tai sutampa su perëjimo ið mezolito á neolità faze, bronzos amþiuje bei XIII–XIX amþiais. Ryðkus ûgio padidëjimas stebëtas tarp vëlyvojo neolito virvelinës keramikos kultûros þmoniø, geleþies amþiuje (V–XII amþiai) bei tarp dabartiniø gyventojø (XX a.).

Nustatyta, kad bent jau nuo geleþies amþiaus esama geografinio ûgio gradiento: jis maþëja einant ið vakarø á rytus. Ðá geografiná ûgio gradientà nulëmë genetiniai, klimatiniø, geografiniø ir ekonominiø sàlygø tarp rytø ir vakarø Latvijos skirtumai.

Vertinant ûgio pokyèius daroma iðvada, kad vyrø ûgio svyravimai yra didesni negu moterø ir patvirtinama nuomonë, kad moterø organizmas yra atsparesnis nepalankioms sàlygoms.