https://doi.org/10.18778/1898-6773.43.2.08

PRZEGLĄD ANTROPOLOGICZNY
Tom 43 z. 2 — Poznań 1977

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CRANIOLOGICAL CHARACTERISTICS OF THE 14TH - 17TH CC. POPULATION IN LITHUANIA

III. NON-METRIC TRAITS

We have presented the general characteristics of the osteological materials from the 14 - 17th cc. Lithuanian cemeteries and the Penrose's analysis of metric traits in the previuos chapters [7] of this work. The present report is the next step in analysing the same material, and it has the aim to estimate the frequency of non-metric (discrete, epigenetic) traits in the pooled sample, to calculate the mean measures of divergence *(MMD)* between variuos samples, to check the correlation between biological distances derived from metric and non-metric traits, to look for ways that would enable to differentiate according to non-metric traits the craniometrically homogeneous collection of the 14th - 17th cc. Lithuanian crania.

MATERIALS AND METHODS

The description of the geographical location, chronology and archeological references of the sites, yielding the samples of the present report, one can find in the previous publications [7]. The samples of Strėva, Uliunai and Šlapgiris were too small (less than 20 skulls) to use them in the distance analysis as separate units, that is why the single separate sample was formed of them by adding single crania from the other synchronous Lithuanian sites (Akmeniai, the Kelmė region, — 7, Graužai, the Kėdainiai region, — 3, Riklikai, the Anykščiai region, — 3, Šeimyniškėliai, the Anykščiai region, — 3, Kybartiškės, the Šiauliai region, — 1, Seredžius, the Jurbarkas region, — 1). In addition to these already described samples, one more sample from Puziniškis (the Panevėžys region) excavated about 1909 - 10 by Jonas Basanavičius, was separately analysed. Unfortunately, its chronology and documentation is doubtful, that is why it was considered in this report with some reservations. The size and sex structure of the samples are shown in Table 1. The depend-

Tab. 1. The sex and age structure of the 14th-17th cc. Lithuanian samples

Sample	Males		Females		?		Subadults		Total	♂/♀×100
	N	%	N	%	N	%	N	%		
Geluva	45	46.4	41	42.3	3	3.1	8	8.2	97	52.3
Kavarskas	45	47.9	42	44.7	–	–	7	7.4	94	51,7
Rumšiškės	32	43.8	30	41.1	–	–	11	15.1	73	51.6
Jakštaičiai	23	41.1	29	51.8	–	–	4	7.1	56	44.2
Skrebinai	28	56.0	20	40.0	1	2.0	1	2.0	50	58.3
Liepiniškės	15	53.6	11	39.3	–	–	2	7.1	28	57.7
Sūduva	9	40.9	7	31.8	–	–	6	27.3	22	56.2
Puziniškiai	11	47.8	10	43.6	1	4.3	1	4.3	23	52.4
Ruseiniai	18	64.3	10	35.7	–	–	–	–	28	64.3
Selected sample	21	52.5	17	42.5	–	–	2	5.0	40	55.3
Total	247	48.3	217	42.5	5	1.0	42	8.2	511	53.2

ence of non-metric traits on sex and age will be described in future reports, this one deals mostly with the question of affinity or divergence between samples without speculations on the advantages and shortcomings of the method that are evaluated well enough by other investigators [3, 11, 15, 18, 20, 22].

The divergence analysis is recommended to be done separately for male and female skulls, because some workers [11, 22] have pointed to sex association of several non-metric traits. Unfortunately, this would decrease the size of the samples and distort the *MMD* values. Making a compromise, we have followed a precedent by J. M. Suchey [22] and analysed only adult crania keeping approximately equal proportion of the sexes.

Non-metric traits were diagnosed mostly after A. C. Berry, R. J. Berry [3, 4] with some additions from A. Movsesyan [18] and some modifications of our own. Thus, a complete and incomplete epipteric bone were joined into one group, though H. B. Collins [10] finds them being of a different origin. The different forms (H, K and X) of stenokrotaphy, or fronto-temporal articulation [1], were summed, too. Contrary to A. C. Berry, R. J. Berry [3], ossicle at lambda was considered to be a separate trait, for it occurred quite frequently in our collection. All forms of Inca bone, complete and incomplete [18], were lumped together including triquetral and square (os quadratum) ossicles. The origin of these bones is not the same [14], but their frequency is too low to consider them as separate components of the divergence analysis. Interparietal bone (os sagittale) was eliminated from the group of Inca bones [18] and included in the cathegory of sagittal ossicles (ossa Wormiana suturae sagittalis). By the way, the skulls were eliminated from sutural bone statistics if the cranial sutures were ossified and the ossicles were not to be seen well enough. All forms and degrees of palatine torus [18] were lumped together being counted as "present" in order to keep the principle of discretion. The broken transversal palatine suture (not meeting in one point of the longitudinal palatine suture)

Tab. 2. The inter-group variation of non-metric traits in lithuanian crania

No	Trait	Min-Max	$\frac{\text{Max-Min}}{\text{Max}} \times 100$	$\bar{p}$	δ	V
1	Epipteric bone	.1785 - .4038	55.8	.2833	.075	26.5
2	Stenokrotaphy	.0000 - .1704	100.0	.0885	.057	64.4
3	Parietal notch bone	.1111 - .2592	57.1	.1832	.042	22.9
4	Squamous ossicles	.0000 - .1333	100.0	.0566	.040	70.7
5	Ossicle at lambda	.0400 - .2456	83.7	.1231	.064	52.0
6	Inca bone	.0000 - .0952	100.0	.0478	.026	54.4
7	Lambdoid ossicles	.5000 - .7121	29.8	.5916	.074	12.5
8	Coronoid ossicles	.0000 - .1052	100.0	.0407	.039	95.8
9	Sagittal ossicles	.0000 - .1428	100.0	.0520	.048	92.3
10	Bregmal ossicle	.0000 - .0535	100.0	.0097	.018	185.6
11	Asterial ossicle	.1195 - .4090	70.8	.2294	.095	41.4
12	Palatine torus	.2181 - .6216	64.9	.4325	.124	28.7
13	Metopism	.0000 - .1304	100.0	.0629	.046	73.1
14	Transversal palatine suture broken	.0545 - .3214	83.0	.1580	.085	53.8
15	Condylar facete double	.0000 - .1304	100.0	.0503	.039	77.5
16	Precondylar tubercle	.0000 - .1304	100.0	.0623	.049	78.6
17	Parietal foramen absent	.2592 - .5312	51.2	.4215	.109	25.9
18	Mastoid foramen absent	.0952 - .2647	64.0	.1692	.047	27.8
19	Foramen ovale open	.0000 - .1666	100.0	.0533	.047	88.2
20	Foramen spinosum open	.1562 - .4230	63.1	.2572	.092	35.8
21	Minor palatine foramina accessory	.4571 - .8148	43.9	.5829	.116	19.9
22	Supraorbital foramen present	.0476 - .4464	89.3	.2551	.109	42.7
23	Frontal foramen present	.0800 - .2500	68.0	.1654	.054	32.6
24	Infraorbital foramen accessory	.0625 - .3076	79.7	.1983	.087	43.9
25	Orbital osteoporosis	.0744 - .3214	76.8	.1768	.080	45.2
26	Posterior condylar canal absent	.0740 - .2083	64.5	.1352	.066	48.8
27	Anterior condylar canal double	.1428 - .4324	67.0	.2848	.098	34.4
28	Huschke's foramen (tympanicum)	.0729 - .1842	60.4	.1246	.044	35.3
29	Zygomaticofacial foramina absent	.0000 - .2500	100.0	.1461	.077	52.7
30	Mental foramen accessory	.0000 - .1818	100.0	.0846	.094	111.1
31	Mylohyoid bridge	.0000 - .3636	100.0	.1077	.099	91.9
32	Pterygospinal bridge	.0000 - .1500	100.0	.0771	.049	63.5
33	Mastoid foramen exsutural	.3928 - .6923	43.3	.5378	.092	17.1
34	Anterior ethmoid foramen exsutural	.2400 - .6250	61.6	.4225	.104	24.6

was added as a new non-metric trait, for it had occurred less frequently than other forms of transversal palatine suture and at different rates in the samples of our material, thus it may be considered to be some kind of anomaly. All varieties of precondylar tubercle [5] were summed and counted as present. Accessory mental foramen was included in our programme under a suggestion of M. F. Ashley-Montagu [2], mylohyoid bridge and pterygospinal bridge (foramen pterygospinosum) were taken from the list of A. Movsesyan [18]. Some rather popular non-metric traits were deleted either because of scoring difficulties (nuchal torus, maxillary torus, posterior ethmoid foramen), or because they have not occurred in our collection at all (auditory torus, double zygomatic bone, double parietal bone etc.). Thus, 34 non-metric traits (Table 2) were selected finally for the divergence analysis. The unilateral and bilateral presence of traits was scored, however, the individual cranium, not the side, was a unit of study for distance calculation in order not to inflate the sample size artificially [22].

The mean measure of divergence (*MMD*) used in this study and suggested by M. S. Grewal [12], A. C. Berry, R. J. Berry [3] and J. M. Suchey [22] is as follows:

$$MMD = \sum_{i=1}^{N} \frac{(\theta_1 - \theta_2)^2 - \left(\frac{1}{n_1} + \frac{1}{n_2}\right)}{N}$$

where θ refers to the angular value in radians corresponding to the frequency in the sample, n refers to the size of the sample, and N is the number of traits used in the study.

$$\theta = \text{Arc sin}(1 - 2p)$$

where p is observed frequency of the trait, using Bartlett's adjustment [21, 22] for all zero frequencies (when traits are totally absent, the frequency 1/4n is used instead of 0.00).

MMD was considered to be significant ($P < 0.05$) when it was twice as great as its standard deviation [21]:

$$SD_{MMD} = \sqrt{\frac{2}{N^2} \sum_{i=1}^{N} \left(\frac{1}{n_1} + \frac{1}{n_2}\right)^2}$$

RESULTS AND DISCUSSION

It is difficult to judge whether the non-metric traits scored in the 14th - 17th cc. Lithuanian pooled craniological material are of high or low occurrence as elsewhere throughout the world for such summaries are scanty in the literature and, in addition, frequencies usually are calculated using the side of the skull as a unit. In the latter case, the frequencies are by 1/3 — 1/4 lower than using the skull as a unit. J. M. Suchey [22] presented graphically the range of world-wide variation of 18 non-metric traits, and this helped us in approximate evaluation of our data. In addition, the data on the North European samples [4] were used.

The great majority of non-metric traits in the 14th - 17th cc. pooled Lithuanian material may be considered as of moderate occurence against the background of world-wide variation. Double condylar facet, precondylar tubercle, complete supraorbital foramen and absence of zygomaticofacial foramina occur rarely in the Lithuanian skulls. Epipteric bone and double anterior condylar canal (canalis n. hypoglossi duplex) are of a very high occurrence. A frequent epipteric bone is apparently a natural phenomenon in Lithuanian crania. So its frequency was about 12% in the 14th - 16th cc. sample from Lankiškiai [23], 21.1% in the 18th - 19th cc. sample from Kaunas, and 22.6% in the 20th c. Lithuanian sample

[25], against the data by H. B. Collins [9] who has found only 3% of epipteric bone in the huge (15 thousands) collection of European skulls. The Lithuanian crania are notable for a comparatively frequent presence of lambdoid ossicles (ossa Wormiana suturae lambdoideae), exsutural anterior ethmoid foramen, open foramen spinosum and orbital osteoporosis (cribra orbitalia). As regards the latter trait, the literature data are quite controversial: on the one hand it is considered to be not characteristic of Europeans [23], on the other hand its frequency in the whole of Europe is estimated 17 - 19% [13], and in the 15th - 16th cc. Hungarians 14.5% [19], that is as high as in our collection. The incredibly high occurrence of palatine torus in our pooled sample (J. Žilinskas and A. Jurgutis have estimated about 22% in the 18th - 19th cc. and only 12% in the 20th c. Lithuanians) can be explained by the use of different methods of scoring. We have taken into account all forms and sizes of tori, and the majority of investigators pay attention only to the considerable ones. A. Cocchi [8] established 52% of the torus in the Italian population using the same approach as we have used. The torus is of high occurrence in the Norwegian population [4]. To all appearances, the scoring differences are to be blamed for the discrepancies in Inca bone frequency between this report and those of previous Lithuanian writers: J. Žilinskas and A. Jurgutis [25] have detected 1.4% of Inca bone in the 18th-19th cc. and about 3% in the 20th c. Lithuanians, and L. Kuppfer [17] — only 1.2% in the 19th c. population of East Prussia. The percentage of metopism is in our collection much lower than in the data on Lithuanians presented by other authors [15, 23, 25]; obviously for the reason that we have not considered the slight traces of the suture in the nasal part of frontal bone.

Non-metric traits are distributed unequally in different samples (Tables 2 and 3). The greatest amount of variability is characteristic of bregmatic bone, sagittal and squamous ossicles (ossa Wormiana suturae sagittalis et squamosae), open foramen ovale and mylohyoid bridge.

We have derived the *MMD* values from the data presented in Table 3 for every pair of our samples (Table 4), under the main diagonal. Extremely low MMD values in the majority of comparisons are evident — no value reaches the level 0.1 (the maximal is 0.0617). The selected 14th - 17th cc. sample is very near to all others, and no wonder, for the sample consists of skulls from the sites widely scattered throughout Lithuania. The sample from Sūduva is close to almost all others, too, and two factors may have influenced the magnitude of the MMD values: the sample, too, has been selected from various sites [7], besides, it is scanty, and the $1/n$ dimension in *MMD* formula may have distorted inadequately the *MMD* values.

All samples in general are very close, and this testifies the homogeneity of the collection. However, some kind of geographical polarization

Tab. 3. The frequency of non-metric traits in the 14th-17th cc. Lithuanian samples (the trait nummeration as in the Table 2)

	Géluva	Kavarskas	Rumšiš-kės	Jakštai-čiai	Skrebi-nai	Liepi-niškės	Rusei-niai	Sūduva	Puziniš-kis	Selected sample	Pooled material
1	.2696	1951	.2950	.4038	.3333	.2857	.1785	.3846	.2272	.2647	.2757
2	.1704	.0493	.0666	.1538	.0444	.0357	.1111	.0000	.1363	.1176	.0964
3	.1684	.2065	.2089	.1666	.1800	.2592	.1785	.1111	.1304	.2222	.1877
4	.1052	.0777	.0147	.0754	.0200	.0000	.0357	.1333	.0434	.0606	.0602
5	.1250	.1976	.1714	.2456	.1086	.1071	.0400	.0952	.0869	.0540	.1431
6	.0520	.0000	.0571	.0175	.0434	.0357	.0800	.0952	.0434	.0540	.0408
7	.5180	.5853	.7121	.6181	.5581	.6428	.6000	.5000	.6818	.5000	.5921
8	.0574	.0222	.0144	.0740	.0434	.0000	.0000	.1052	.0909	.0000	.0379
9	.0000	.0571	.0634	.0851	.0000	.0357	.0000	.1428	.1052	.0312	.0455
10	.0109	.0109	.0000	.0535	.0222	.0000	.0000	.0000	.0000	.0000	.0127
11	.1489	.1195	.2586	.1395	.1250	.2222	.2692	.3076	.4090	.2941	.1884
12	.3578	.4111	.4057	.2181	.4400	.5357	.6071	.3750	.3529	.6216	.4123
13	.0618	.0531	.0547	.1250	.0000	.1071	.0000	.0454	.1304	.0512	.0607
14	.0760	.0930	.1587	.0545	.2448	.1785	.3214	.0769	.1764	.2000	.1394
15	.0833	.0263	.0434	.0588	.0652	.1304	.0370	.0000	.0000	.0588	.0546
16	.0769	.0348	.0322	.0000	.1276	.0384	.0714	.0000	.1304	.1111	.0594
17	.5312	.4516	.4647	.5090	.4400	.3571	.2592	.4285	.2608	.5128	.4532
18	.1827	.1666	.1764	.1568	.1666	.2142	.1153	.1538	.0952	.2647	.1736
19	.0434	.0116	.0000	.0740	.0408	.0384	.0370	.1666	.0909	.0303	.0392
20	.2717	.1627	.1607	.2363	.3265	.4230	.3200	.3333	.1818	.1562	.2395
21	.6559	.4880	.5161	.5357	.7346	.5384	.8148	.5000	.5882	.4571	.5754
22	.3711	.2978	.2318	.4464	.3000	.1785	.2500	.0476	.2173	.2105	.2916
23	.1443	.2021	.1285	.1250	.0800	.2500	.2500	.1428	.1739	.1578	.1663
24	.0625	.2159	.1578	.1818	.0816	.1428	.3076	.3000	.2666	.2666	.1670
25	.1443	.0744	.1944	.1607	.2000	.2857	.3214	.1111	.0869	.1891	.1630
26	.1666	.1279	.1489	.1320	.0909	.2083	.0740	.1111	.0869	.2058	.1395
27	.3010	.2888	.2807	.1785	.2553	.1923	.1428	.4285	.3478	.4324	.2781
28	.0729	.1182	.1000	.1428	.1836	.1785	.0740	.1052	.0869	.1842	.1202
29	.1473	.0689	.0833	.1454	.2244	.2142	.1851	.2500	.0000	.1428	.1359
30	.1030	.0540	.1212	.0714	.0000	.1071	.0740	.0952	.1818	.0384	.0792
31	.1250	.1052	.0298	.0727	.1041	.0000	.1153	.0500	.3636	.1111	.0927
32	.0430	.0697	.0727	.0357	.1250	.1481	.0714	.0000	.1500	.0555	.0747
33	.5806	.5340	.5098	.6470	.5000	.3928	.5384	.6923	.5714	.4117	.5386
34	.4324	.4285	.3571	.4545	.4761	.4800	.2400	.6250	.4210	.3103	.4132

Tab. 4. The *MMD* values between Lithuanian samples (The lower left triangular half represents the *MMD* derived from 34 non-metric traits, the upper right triangular half represents *MMD* derived from the 16 most variable traits)

	Géluva	Kavar-skas	Rumšiš-kės	Jakštai-čiai	Skrebi-nai	Liepi-niškės	Rusei-niai	Sūduva	Puziniš-kis	Selected sample
Géluva		.0295*	.0319*	.0178	.0380*	.0376*	.0084	.0023	.0332	−.0100
Kavarskas	.0196*		.0078	.0158	.0359*	.0258	.0320	.0092	.0434	.0035
Rumšiškės	.0257*	.0136*		.0303*	.0438*	−.0195	.0028	.0071	.0504*	−.0030
Jakštaičiai	.0124	.0149*	.0320*		.0826*	.0306*	.0669*	−.0240	.0561*	.0342
Skrebinai	.0131	.0281*	.0484*	.0433*		.0090	−.0192	.0269	.0768*	−.0171
Liepiniškės	.0238*	.0211	.0027	.0239	.0021		−.0079	−.0107	.0766*	−.0123
Ruseiniai	.0292*	.0409*	.0218	.0617*	.0040	.0000		.0011	.0282	−.0516*
Sūduva	.0069	.0017	.0000	−.0037	.0169	.0197	.0079		.0286	−.0080
Puziniškis	.0249	.0157	.0179	.0360*	.0466*	.0371	.0073	−.0212		.0120
Selected sample	.0063	.0032	.0071	.0311*	.0071	−.0049	−.0029	−.0308	−.0019	

* $P < 0.05$

is observed in the summary table of *MMD* values. One group of samples that we shall relatively call the south-eastern one (Liepiniškės, Rumšiškės, Skrebinai and Ruseiniai) is extremely closely affined (the *MMD* values do not reach 0.01). The second group, the north-western one

(Jakštaičiai, Gėluva and Kavarskas), are close as well but not in the same degree as the previous one (the *MMD* values from 0.0101 to 0.0300). The boundaries between the groups are not marked, there are numerous mutual connections, and, thus, the picture of geographical polarization is indistinct.

When looking for the reason of this phenomenon, we have come to the idea that not all non-metric traits may be of equal discriminatory value in synchronous craniological material from such a small territory. The most popular traits in the area may disguise the differences between the *MMD* values that may occur due to presence of specific local traits. The local traits can be detected from the range of inter-group variation (Table 2). Only 16 of 34 non-metric traits scored in this programme have the values of variation coefficients over 50%. Theoretically, it is just the 16 traits that reflect regional diversity to a high degree, so they should have more discriminatory value. The *MMD* derived from the 16 most variable traits have confirmed the idea: only 15.6% (out of 45) of *MMD* values remained the same as calculated from all 34 traits, 31.1% decreased and as many as 53.3% increased (Table 4, above the main diagonal). The distances between the Sūduva sample, the selected sample and the other ones were even more reduced, but the serious diversity of the Puziniškis sample became evident. It is difficult to find the reason for that fact. Apparently, that is the result of mentioned above dubious chronology and documentation of the Puziniškis sample.

The traces of geographical polarization have become more evident in the summary table of *MMD* values derived from the 16 most variable traits (Table 4), above the main diagonal the series of the south-eastern group (Liepiniškės, Rumšiškės, Skrebinai and Ruseiniai) show a close affinity between each other, and the distance between the series of the north-western group (Jakštaičiai, Gėluva and Kavarskas) is a little larger. Liepiniškės, the easternmost sample, is the 'epicentrum' of the first group, and Jakštaičiai, the westernmost sample, is the 'epicentrum' of the second one. Transitional, connective series are scattered in the contact zone of the groups. When comparing the frequencies of single traits in 'epicentra' (Table 3), it becomes evident that sutural ossicles (epipteric bone, ossicle at lambda, bregmatic bone, coronoid, sagittal and squamous ossicles) as well as stenokrotaphy are dominating in Jakštaičiai (and partially in adjacent samples), and palatine torus, pterygospinal bridge and parietal notch bone (os incisurae parietalis) are quite common in Liepiniškės (and partially in the series of its group). We must abandon the explanation of the genesis of this regional diversity because of lack of similar data from the outlying districts of Lithuania proper and from the neighbouring countries. Nevertheless, our principle of deriving the *MMD* values from the most variable non-metric traits in the area has justified itself. To all appearances, this principle is to be used when it

is necessary to reveal subtle regional differenciation in a comparatively homogeneous craniological collection. Some kind of selection of non-metric traits has also been suggested by A. Kozintsev [15], in the individual craniological diagnosis.

Finally, it was of some interest to check up if the geographical polarization according to non-metric traits is congruent with that according to metric traits. We were not able to calculate the correlations between the *MMD* values and the Penrose's coefficients because of not having estimated the *MMD* for males and females separately. We had to confine ourselves with examination of the general trend. For that purpose, the Penrose's coefficients for males and females [7] were compared with the *MMD* values derived from the samples of mixed sexes. The Penrose's coefficients are very small in both male and female samples, and this testifies to their close morphological kinship. However, the minimal values of the coefficients (0.01 - 0.10) connect the samples from the Central Lithuania sites (Kavarskas, Ruseiniai, Skrebinai, Gėluva and Rumšiškės). The westernmost Jakštaičiai and easternmost Liepiniškės are close to other samples as well (0.1 - 0.2), but the divergence between them is much greater, and they are considered to be some kind of poles. By the way, such a polarization is less evident in female samples. The *MMD*, especially those derived from the most variable non-metric traits, make the geographical polarization of the samples obvious. The close related Central Lithuanian samples divide themselves 'pulled' by the eastern and western poles: Liepiniškės 'pulls' Ruseiniai, Skrebinai and Rumšiškės, and Jakštaičiai 'pulls' Gėluva and Kavarskas. Thus, the results of distance analyses from metric and non-metric traits are congurent and they supplement each other, and both of them make evident the trend of the geographical differentiation of the 14th - 17th Lithuanian samples.

CONCLUSIONS

1. The 14th - 17th cc. Lithuanian skulls are notable for a comparatively low occurrence of double condylar facet, precondylar tubercle, complete supraorbital and frontal foramina, and high occurence of epipteric bone, double anterior condylar canal, zygomaticofacial foramina, lambdoid ossicles, exsutural anterior ethmoid foramen, open foramen spinosum.

2. The *MMD* values derived from non-metric traits are very low in the great majority of sample pairs, still the traces of geographical polarization according to the most variable traits are detected — the south-eastern and north-western groups of affined samples stand out.

3. When examining homogeneous craniological material, the calculation of *MMD* should be based on the most variable inter-group non-

-metric traits that seem to be of more discriminatory value in this case.

4. The distance analyses from both metric and non-metric traits show a common trend and supplement each other in this specific case.

LITERATURE

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KRANIOLOGICZNA CHARAKTERYSTYKA XIV - XVII-WIECZNEJ LUDNOŚCI LITWY. III. CECHY NIEMETRYCZNE

GINTAUTAS ČESNYS

Praca niniejsza jest kontynuacją badań prowadzonych przez autora na litewskich materiałach szkieletowych. W poprzednich opracowaniach przedstawiono ogólną charakterystykę materiału oraz analizę odległości Penrose'a na podstawie cech metrycznych 7. W świetle tej analizy całość litewskiego materiału kraniologicznego okazała się w zasadzie homogeniczna.

Spis badanych materiałów wraz z charakterystyką pod względem liczebności oraz strukturą płci i wieku zawiera tabela 1. W wyborze cech niemetrycznych autor kierował się zaleceniami podanymi w obszernej literaturze oraz własnym doświadczeniem badawczym i możliwościami obserwacji, jakie dawał materiał. Spis ostatecznie wybranych do badań 34 cech, wraz z charakterystyką statystyczną ich występowania w materiale litewskim, przedstawiają tabele 2 i 3.

Na podstawie częstości występowania cech niemetrycznych w poszczególnych seriach czaszek autor obliczał odległości biologiczne pomiędzy nimi stosując średnią miarę rozbieżności *MMD* obliczaną według wzoru podanego na str. 350. Obliczenia *MMD* wykonano osobno dla wszystkich 34 cech podanych nad przekątną w tabeli 4 oraz dla 16 cech wykazujących największą zmienność pomiędzy seriami litewskimi pod przekątną w tabeli 4. Ten ostatni zabieg wykonano celem zwiększenia mocy dyskryminacyjnej *MMD*.

Ostatecznie stwierdzono, że mimo iż wartości *MMD* są bardzo małe dla ogromnej większości porównań między seriami (znaczna homogeniczność materiału), zaznacza się geograficzna polaryzacja serii na grupy: południowo-wschodnią i północno-zachodnią. Stwierdzenie to zgodne jest z wnioskiem wyciągniętym na podstawie analizy cech antropometrycznych.