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QUESTION OF ARCHI- AND NEOMORPHIC PATTERN OF THE HUMAN SKULL

This Report intends to answer the following questions on the basis of the available Polish material:

1. do exist the intrapopulational associations between cranioscopic traits which express an archi- or neomorphic structure of the human skull?
2. do they change in the time lapse of the last millenary?

In the first approximation, the total series of crania from the church--yards excavated at Wiślica (District Kielce, Southern Poland) and dated on the X - XIX th Century was considered. The cranioscopic traits were established by the present author on the basis of a set of photographic scales constructed by Michalski. The power of associations between the selected traits which express the relief of frontal region, profilisation of maxilla and the mental protuberance of mandible was estimated by the coefficient of r_p of Góralski, according to the following formula:

$$r_p = \pm\sqrt{\frac{k^{m-1}}{k^{m-1}-1}\cdot\frac{x^2}{x^2+N}}$$

(where: r_p — the coefficient of association's power: k — the minimum number of categories of a division of one out of m-traits considered N-number of items). The table 1 represents the matrix of r_p in pairs of traits, calculated for male and female skulls. It demonstrates the existence of moderate or strongly significant associations between all the traits which refer to the shape and relief of the frontal bone. However, the facial characteristics show a more dispersed structure. Thus, the depth of maxillary incisure is associated with the canine fossa only within the male series and the depth of canine fossa together with prominence of maxilla is associated with the mental protuberance within both sexes.

Out of the total set of facial traits, only the prominence of maxilla is significantly associated with one of the neurocranial features, ie. with the shape of the forehead. But, someone may say that all these results which seem to prove the existence of intrapopulational, organised patterns of traits could be an effect of the time factor, since they change microevolutionarily in Poland (see: A. Wierciński, 1974) and since, the analysed series included crania from X th to XIX th Century. In order to reply on this objection, the material was divided into two chronological series: the earlier one, dated on the X - XIII th Century (N=100) and the later one, dated on the XVII - XX th Century (N=105). This material has been enlarged thanks to the more recent investigations in the region of Wiślica. There were analysed only the male crania since they display a greater variability in respect to the traits considered. The analysis was carried out by use of the multiple stochastic correlations method of Wanke (see: A. Wierciński 1967) in order to estimate the associations, at the same time, in the more than two traits. Unfortunately, too small number of crania allowed only the selection of four characters. Thus, there were analysed two traits of the frontal region (A. inclination of forehead and B. development of glabella) and two traits of the facial portion (C. prominence of maxilla and D. depth of maxillary incisure).

Their division into two categories aims to correspond to the archimorphic (category 1) and neomorphic (category 2) cranial patterns respectively (see: table 2).

The data presented in the table 3 may be summarized as follows:

a) usually, there is a decrease of the percentages of extreme archimorphic combinations (11 . .) and an increase of the neomorphic one (22 . .), when passing from the earlier series to the later one,
b) in a majority of cases, the positive though insignificant surpluses appear at the places of these extreme combinations,
c) the significant associations appeared only within the earlier series in the combinations: A×B, A×B×C, A×B×D and A×B×C×D while they do not exist in all the combinations of traits within the later series.

However, after removing the Chi-squares of interactions (Lancaster's method) from the mentioned above associations in the earlier series, all of them decreased below the level of significance (accordingly: X^2_{int} for A×B×C=2.36 with P>0.10, for A×B×D=0.47 with P>0.30 and, for A×B×C×D=2.25 with P>0.10). It appeared that these associations were caused only by undoubted and strong association of A×B.

Table 1

Matrix of coefficients of association's power (r_p) between cranioscopic traits

Females	Males 9	24	11	10	32	31	45	18
9. Inclination of forehead	–	0.43* +	0.28 +	0.38* +	0.41 –	0.32 –	0.14 –	0.24 –
24. Supraorbital arc	0.47* +	–	0.61* +	0.28 +	0.32 –	0.28 –	0.22 +	0.25 +
11. Glabella	0.50* +	0.79* +	–	0.53* +	0.46* +	0.32 +	0.14 –	0.19 –
10. Shape of forehead	0.76 +	0.47 +	0.43 +	–	0.22 –	0.17 –	0,28 –	0.30* +
32. Depth of maxillary incisure	0.25 –	0.14 –	0.18 +	0.41 +	–	0.51* +	0.08 –	0.33* –
31. Depth of canine fossa	0.28 +	0.18 –	0.15 –	0.32 +	0.06 +	–	0.38 –	0.19 –
45. Mental protuberance	0.36 +	0.32 –	0.26 –	0.35 –	0.43 –	0.48* –	–	0.33 +
18. Prominence of maxilla	0.20 –	0.27 +	0.34 –	0.31 +	0.23 –	0.28 –	0.54* +	–

Explanations; minus or plus with r_p value denotes disagreement or agreement with expectation of association's direction and * significance level below 0.05

Table 2

The division of cranioscopic traits into categories and coordinated frequencies

Traits	Categories		Earlier series		Later series	
	1	2	1	2	1	2
A. Inclin. of forehead (9)	1 - 5	6 - 12	69	31	80	25
B. Glabella (11)	1 - 6	7 - 14	71	29	61	44
C. Prominence of max. (18)	1 - 10	11 - 16	62	38	41	64
D. Maxillary incisure (32)	10 - 6	5 - 1	32	68	50	55

Table 3

Frequency distributions and associations in chronological series of crania (pairs of traits)

Traits	AxB		AxC		AxD		BxC		BxD		CxD	
Comb.	E	L	E	L	E	L	E	L	E	L	E	L
1 1	56.0+	47.6+	41.0−	30.5+	22.0−	35.2−	44.0−	24.8+	21.0−	28.6+	20.0+	18.1−
1 2	13.0−	28.6−	28.0+	45.7−	47.0+	41.0+	27.0+	33.3−	50.0+	29.5−	42.0−	21.0+
2 1	15.0−	10.5−	21.0+	8.6−	10.0+	12.4+	18.0+	14.3−	11.0+	19.0−	12.0−	29.5+
2 2	16.0+	13.3+	10.0−	15.2+	21.0−	11.4−	11.0 −	27.6+	18.0−	22.9+	26.0+	31.4−
x^2	11.16	2.67	0.62	0.13	0.0013	0.25	0.0001	0.79	0.66	0.14	0.005	0.04
$P(x^2)$	<0.01	>0.10	>0.30	>0.70	>0.95	>0.50	>0.95	>0.30	>0.30	>0.70	>0.95	>0.95
r_p	0.45+	0.23+	0.15−	0.05+	0.01−	0.07−	0.001−	0.13+	0.12−	0.05+	0.01+	0.03−

Explanations; signs plus or minus denote the places of positive or negative surpluses in the method of stochastic correlations (here, usually insignificant).

Table 3 (continued): theree traits and four traits

Combination	AxBxC		AxBxD		AxCxD		BxCxD	
	E	L	E	L	E	L	E	L
1 1 1	35.0+	21.0+	16.0+	23.8+	15.0+	14.2+	13.0−	11.4+
1 2 1	21.0+	26.7−	40.0+	23.8+	26.0−	16.2+	31.0+	13.3+
1 1 2	6.0−	9.5−	6.0−	11.4−	7.0−	21.0−	8.0−	17.1+
2 1 1	9.0−	3.8−	5.0−	4.8−	5.0−	3.8−	7.0+	6.7−
1 2 2	7.0−	19.0−	7.0−	17.1+	21.0+	24.8+	19.0+	16.2−
2 1 2	6.0−	6.7−	10.0−	5.7−	16.0+	4.8−	11.0−	7.6−
2 2 1	12.0+	4.8+	5.0+	7.6+	5.0+	8.6+	4.0+	12.4+
2 2 2	4.0+	8.6+	11.0+	5.7+	5.0−	6.7−	7.0−	15.2+
x^2	10.14	3.71	12.29	4.12	3.65	0.72	0.67	1.10
$P(x^2)$	<0.01	>0.30	<0.01	<0.30	>0.30	>0.95	>0.95	>0.80
r_p	0.41+	0.21+	0.38+	0.22+	0.22−	0.10−	0.09−	0.12+

Combination	AxBxCxD	
	E	L
1 1 1 1	12.0+	10.5+
1 1 1 2	23.0+	10.5+
1 1 2 1	4.0−	13.3+
1 2 1 1	3.0−	3.8−
2 1 1 1	1.0−	1.0−
1 1 2 2	17.0+	13.3−
1 2 1 2	3.0−	5.7−
2 1 1 2	8.0−	2.9+
1 2 2 1	3.0+	7.6−
2 1 2 1	4.0+	3.8−
2 2 1 1	4.0−	2.9+
1 2 2 2	4.0+	11.4+
2 1 2 2	2.0−	2.9−
2 2 2 1	1.0−	4.8+
2 2 1 2	8.0+	1.9−
2 2 2 2	3.0+	3.8+
x^2	20.55	5.94
$P(x^2)$	<0.05	>0.80
r_p	0.44+	0.25+

Table 4

Comparison of coefficients of association's power (r_p)

		Total series: males					Earlier series: males			
		A	B	C	D		A	B	C	D
Females	A	–	0.28+	0.24−	0.41−	Later series	–	0.45*+	0.15−	0.01−
	B	0.50*+	–	0.19−	0.46*+		0.23+	–	0.001−	0.13−
	C	0.20−	0.34−	–	0.33−		0.05+	0.13+	–	0.01+
	D	0.25−	0.18+	0.23−	–		0.07−	0.05+	0.03−	–

Thus, it may be concluded that, at least, in Poland of the last millenary, it seems to proceed a process of disintegration of the pattern of traits which had once characterised the skull of archimorphic ancestors of the modern man (see: table 4).

REFERENCES CITED

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