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AN ANALYSIS OF EPIGENETIC TRAITS ON THE SKELETAL REMAINS OF THE OLD SLAVONIC POPULATIONS FROM DOLNÍ VĚSTONICE, CZECH REPUBLIC

ABSTRACT: The purpose of this article is to describe the incidence of epigenetic traits of the Old Slavonic populations from two medieval burial grounds excavated near Dolní Věstonice (Czech Republic). This research was the matter of the author's Ph.D. dissertation. The osteological material comes from the burial ground "Na Pískách" (8th–11th centuries) and the burial ground "Vysoká zahrada" (12th century). More than 1,000 individuals were discovered at these two sites. Epigenetic traits are non-pathological skeletal varieties which occur in very low frequencies in populations. A kind of hereditary base is assumed for them. The first step of the research was to obtain paleodemographic data of the two populations. Then we were concerned with the evaluation of 175 epigenetic traits (109 on the skull and 66 on the postcranial skeleton). The most important object of our attention was to specify the percentage of each of the traits, their sex- or age dependence and the preference of unilateral or bilateral expression (for bilateral traits). All the results were processed statistically for both of the examined populations, which were compared both one to another and with five other populations.

KEY WORDS: Epigenetic traits – Sex-dependence – Age-dependence – Side expression – Slavs – Dolní Věstonice – Czech Republic

INTRODUCTION

In each bone of the skeleton we can find at least one morphological formation which offers different phenotypic modifications as a result of variability. These so-called epigenetic traits or anatomical variants (or non-metric traits – this term is used particularly in the USA) are slight irregularities of bone shape, which do not influence the organism negatively. They can be divided into different groups according to their manifestations. Typical for them is a lower occurrence in the population and their genetic ground (polygenous heritability) is presumed. Frequently, discreetness is mentioned as their feature (it means only two possible manifestations – presence or absence). But in spite of the non-metric nature of the traits, their appearance may vary to some degree. For example, there can be more than one accessory foramen, or more than one ossicle in a suture. Then the main question is whether (not how) the variant is present.

The aim of this work is to describe the occurrence of selected epigenetic traits in the two examined populations, to set their dependence on sex or age, and a preference of one or both sides of incidence. The two populations were compared to one another and also to other populations.

MATERIAL

The examined osteological material comes from two Old Slavonic localities near the present village Dolní Věstonice

FIGURE 1. The position of the localities in the Czech Republic.

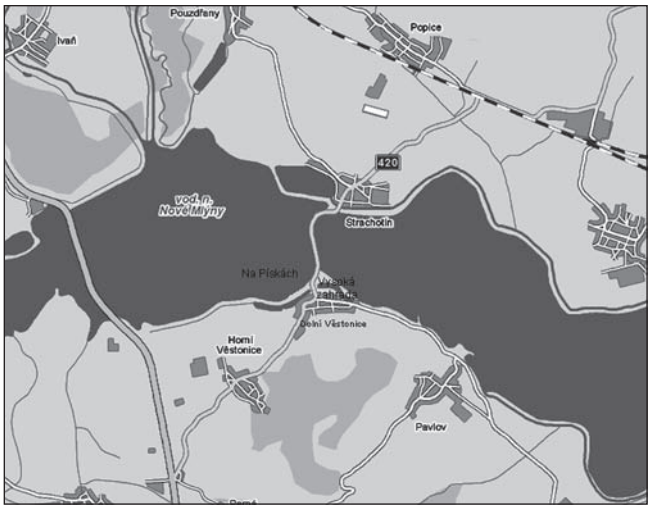

FIGURE 2. The localities in detail.

in the Czech Republic, near the Austrian border (*Figure 1*). The larger of them, called Na Pískách ("On the Sands"), is dated back to the 8th–11th centuries, the smaller one, called Vysoká zahrada ("High Garden") comes from the 12th century. The localities, originally situated at the Dyje River banks, were excavated in 1946–1959. Unfortunately, the osteological material was strongly damaged by floods, very frequent in the area. From 1975–1988 the artificial water reservoirs were built there, and therefore the archaeological site is now partially inundated (*Figure 2*).

The paleodemographic analysis made in 2004 and revised in 2006 proved 893 skeletons from Na Pískách and 129 skeletons from Vysoká zahrada, thus 1022 individuals in total (Hrnčířová, Jarošová 2004, Hrnčířová, Jarošová 2005, Jarošová, Hrnčířová 2005, Hrnčířová, Jarošová 2007). As mentioned above, the state of preservation of the bones was very poor, particularly those from Na Pískách. This fact negatively influenced the final results.

METHODS

On this material, we studied the battery of 175 epigenetic traits, 109 of them at the skull and 66 at the postcranial skeleton; 130 of them are paired, the rest are unpaired. The complete list of evaluated traits is given in *Table 1*.

As the first step, the general percentage of incidence of each trait for both of the investigated populations was calculated, then followed the same calculation for both sexes separately. For bilateral traits, the incidence at both sides of the body was registered separately. The differences between men and women were evaluated with χ^2 test. In a similar way (with χ^2 test) the group of children was compared with the group of adults. This test should discover whether the incidence of the given trait declines with skeletal maturation or not (and vice versa). Then, for bilateral traits, the preference of unilateral or bilateral expression was examined. For each of the bilateral traits, the confidence interval (CI) for the *p* parameter (p=n/N, where N is the total number of individuals who bear the trait unilaterally or bilaterally, and *n* is the number of individuals with bilateral expression of the trait): $CI=p\pm1{,}96\cdot\sqrt{p\cdot(1-p)/N}$. To allow the calculation of the CI, it has to stand $n\cdot p>5$. If the upper limit of the CI>0.95, it is confirmed that the incidence of the trait is significantly bilateral (in 5% level of significance). In an analogical way, we can compute the significance of unilateral expression of the trait (the only change in that case is that n is the number of individuals with unilateral expression of the trait).

To compare acquired results with other population samples, we used the method of Sjøvold (1973): the measure of divergence (MD) between any pair of samples is constructed by the formula $MD=(\Theta_1-\Theta_2)^2-(1/N_1+1/N_2)^2$, where Θ_1 and Θ_2 are angular transformations of each value of incidence of the given trait for the two compared populations according to the formula $\Theta=\arcsin(1-2p)$ in order to stabilize the variance of p. N_1 and N_2 are the numbers of observations from which the incidences were calculated. All measures of divergence for each compared pair of populations are summed and the sum is divided by the number of compared variants to obtain a measure mean of divergence (MMD). At the end, all MMDs form a matrix, from which it is possible (using cluster analysis) to make a graph of distances among populations.

For all the statistical calculations we used software MS Excel 2003 and Statistica 7.0 for Windows.

RESULTS AND DISCUSSION

It is not possible to show here all the results for the 175 investigated traits. Briefly, we made a graph of its side occurrence, sex- and age-dependence for each trait. For bilateral epigenetic traits, the occurrences on each side of the body were registered separately. Complete results are to be found in the Ph.D. dissertation of the author (Hrnčířová 2007).

The sex- and age dependent traits from both localities are summed up in *Table 2*. We can see that the age-dependent traits are always much more numerous than the

TABLE 1. Occurrence of used epigenetic traits for compared populations (%).

	Na Pískách	Vysoká zahrada	Budyně	Mikulčice	Pohansko	Virt	Franzhausen
sutura metopica	9.57	10.5	7.9	7.7	5.34	5.8	8.54
sutura supranasalis	35.1	52.8		61.1			20.3
fissura metopica	0	0		1.5			
ossiculum metopicum	0	0		0			
sutura parametopica	0	0		0			
lophus frontalis	6.41	13.4					42
lingula frontoparietalis	28.3	14.8					9.74
sulcus frontalis	7.48	10.4		34.6			
foramen frontale	15.2	13.3		20.5	12.7	22.3	22.8
incisura frontalis	82.6	80.5		79.6	81.1		
foramen frontale multiplex	0.9	2.34					1.7
incisura frontalis multiplex	1.5	1.56					24.1
foramen supraorbitale	63.2	48		3.5	55.8	11	11.7
incisura supraorbitalis	0.66	3.2		0.4	3.77		
foramen supraorbitale multiplex	0	6.4			0		1.14
foramen supraorbitale absens	35.9	40.8			40.4		
spina trochlearis	6.72	7.5		15.5	10.2		5.29
ossicula suturae coronalis	8.05	15.8	14.4	1.2		2.6	0.33
ossiculum suturae sagittalis	8.74	10.8	10	7.2			7.69
ossiculum bregmaticum	0.41	1.56	0.3	0.5	1.05	0	0.25
os praeinterparietale	5.56	2.9					4.08
ossiculum incisurae parietalis	7.84	7.84	9.7	7.8		6.7	14.3
os parietale partitum	0	0		0	0		0
lingula parietofrontalis	30.1	14.5					10.9
foramen parietale absens	53.8	45.4		58.1	72.3	61	50.4
foramen parietale inferior	2.4	0		0			
depressio biparietalis circumscripta	0	2.82		0			
depressio interparietalis	4.49	5.88					19.4
processus interparietalis	6.26	1.45	7.7	1.7			
os lambdae	8.21	4.41	19.5	20.2		17.2	14.2
os apicis	4.31	4.41					8.25
ossicula suturae lambdoideae	75.6	73	61.8	65.6	58.4	38.7	60.7
os Incae completum	0	0	0	1.2	1.13		0
os Incae bipartitum	0	0	0		0		
os Incae tripartitum	0	0	0		0.56		
os Incae multipartitum	0.21	0	0		0.56		
os Incae incompletum	1.28	1.35	1.8		0		0.2
sutura mendosa	6.37	21	4.3	1.6	6.08		23.9
os asterii	4.46	3.19	30.2	5.5	5.3	7.4	11.9
ossiculum occipitomastoideum	3.33	3.3	18.3				3.08
processus retromastoideus	23.5	41.8		4.3			2.31
torus occipitalis	7.03	24.3		11.1			28.9
foramen occipitale	33.6	30.1		12.6			
facies condylaris bipartita	16.6	4.71		3.3		7.8	0.86
processus paracondylaris	41.6	66.1		1.5			4.82

TABLE 1. Occurrence of used epigenetic traits for compared populations (%) (continued).

	Na Pískách	Vysoká zahrada	Budyně	Mikulčice	Pohansko	Virt	Franzhausen
tuberculum praecondylare	79.7	60.2		3.2		0	5.58
condylus tertius	0.44	0					0.41
tuberculum pharyngeum	75.2	91.8		71.9			62.3
fossa pharyngea	1.72	0		23.8			2.01
fossa praepharyngea	23.7	28.6					25.1
foramen hypoglossale partitum	13.4	13.7		15.3		14	17.3
foramen hypoglossale partitum incompletum	7.37	8.6					11.7
squama temporalis partialis	0	0		1			
ossiculum suturae squamosae	1.47	1.11	7.1	1.2			5.83
processus parietalis squamae temporalis	3.65	2.3		1.4			
foramen squamae superior	1.92	2.44		1.6			
sutura supramastoidea	13.4	33.1					12.6
sutura squamomastoidea	11	33.1		10.2			26.2
processus mastoideus bipartitus	3.02	22.2		2.8			15.6
foramen mastoideum intrasuturam	37.4	52.7		38.6			55.1
foramen mastoideum extrasuturam	58.2	46		58		52.1	34.5
foramen mastoideum accesorium	51.2	51.8					4.48
foramen mastoideum absens	4.09	0				35.9	
foramen tympanicum	19.1	11.9		9.5		19.2	15.6
torus acusticus	1.84	1.46		13		6.2	19.1
spina suprameatica	51.4	59.9		41.9			67.3
processus postglenoidalis	82	79.4					64.7
canalis opticus partitus	0.68	0		0.5			2.78
foramen ovale apertum	0.53	0		1.9			3.41
foramen ovale cum spina	3.4	1.47					12.3
foramen ovale partitum	0.78	0		1.4			3.06
foramen spinosum apertum	18.2	10.7		22.2		26.9	19.3
foramen ovale et spinosum confluens	2.06	0		1.5		2.4	1.89
foramen Vesalii	42.2	30.1		10.9			28.5
stenokrotaphia	0	0	1.2			2.8	1.48
os epiptericum	9.76	11.1	21.4	14.5	16.1	5.6	12.2
sutura frontotemporalis	0	0		1			0.74
processus frontalis ossis temporalis	0.42	0	3.7	3.7			
processus temporalis ossis frontalis	0.36	0	0.3	1.2			
processus parietalis ossis sphenoidalis	16.2	16.7	14.1	14.9			
ossiculum internasale	1.16	0		0			
foramen nasale absens	8.66	14.3		8.5			
os zygomaticum partitum	0	0		0.8	0		0
os japonicum partiale	0	0					0.29
processus marginalis	49.1	55.3		53.9			74.2
foramen zygomaticofaciale multiplex	39.5	42.7			34.8	32.5	33.1
foramen zygomaticofaciale absens	12.6	18.4		6.1	16.3	14.9	20
sutura infraorbitalis	49.2	48.9		64.9			39.1
foramen infraorbitale partitum	1.12	1.75		4.1			
foramen infraorbitale multiplex	8.94	14.3			5.02	3.6	9.62

TABLE 1. Occurrence of used epigenetic traits for compared populations (%) (continued).

	Na Pískách	Vysoká zahrada	Budyně	Mikulčice	Pohansko	Virt	Franzhausen
foramen infraorbitale absens	0	0		0	0		
forma anthropina	62.9	75			84.5		65.7
forma infantilis	27.3	13.5			1.86		22.6
fossa praenasalis	9.85	11.5			13.7		9.85
sulcus praenasalis	0	0			0		2.19
sutura incisiva	27.9	21.8		36.5			1.32
sutura incisiva partialis	44.9	32.7					66.5
ossiculum medianum palatinum anterior	0	0		0			0
torus palatinus	5.63	17.7		19.9	17.2	4.8	8.37
torus maxillaris	0	0		1.1		0	2.19
ossiculum medianum palatinum posterior	0	0		0			0
foramen palatinum maius multiplex	0.72	0					12
foramen mentale partitum	3.36	2.38		0.4			8.68
foramen mentale multiplex	3.33	3.23			3.77	7	
foramen mentale absens	0.57	0		0.4	0.81		
foramen mandibulare accesorium	29.1	25.9		6			
foramen mylohyoideum accesorium	10.3	13					11.7
lingula mandibulae	36.3	57.3					31.2
ponticulus mylohyoideus	1.7	6.72				2.8	6.28
assimilatio atlantis	0.48	1.69		0.7			
facies articularis superior atlantis partita	32.5	24.1		18.2			3.85
ponticulus atlantis lateralis	0	0		1			1.85
ponticulus atlantis posterior	2.7	0		4.1		9.4	4.79
ossiculum dens axis	3.26	0		0.7			
processus spinosus partitus	73.1	87.9					71.3
foramen processus transversi C1 partitum	0	0		0.9	0		4.44
foramen processus transversi C2 partitum	0	2.47		1.3	0		0.52
foramen processus transversi C3 partitum	9.52	0		0	0.56		1.2
foramen processus transversi C4 partitum	27.5	10.9		3.8	7.87		8.65
foramen processus transversi C5 partitum	45.2	30.9		24.6	24.2		28.6
foramen processus transversi C6 partitum	64.3	50		56.6	35.4		53.9
foramen processus transversi C7 partitum	19.2	9.09		12.7	10.7		24
foramen processus transversi C1 apertum	0	0		4.6			7.78
foramen processus transversi C2 apertum	0	0		2.5			4.14
foramen processus transversi C3 apertum	0	0		0			1.75
foramen processus transversi C4 apertum	0	0		0			4
foramen processus transversi C5 apertum	0	0		0			2.63
foramen processus transversi C6 apertum	0	0		0			1.6
foramen processus transversi C7 apertum	17.4	0		1.2			2.53
facies articularis costalis C7	0	6.25		0.8			
facies articularis costalis L1	0	7.32		0			
spina bifida sacralis	15.6	15.6		5.4	3.45		
sacralisation L5	0	7.55			6.9		5.1
lumbalisation S1	25	20			3.45		
sacrum: facies articularis sacralis accesoria	23.8	14.1		9.1			14.3

TABLE 1. Occurrence of used epigenetic traits for compared populations (continued).

	Na Pískách	Vysoká zahrada	Budyně	Mikulčice	Pohansko	Virt	Franzhausen
fenestratio corporis sterni	0	5.88		0	7.14		0
fenestratio manubrium sterni	0	0					0
sternebrae	28.6	0					43.9
symphysis of corpus with manubrium	0	0					3.45
ossiculum acromii	0	7.35		0.9			25.2
ossiculum coracoideum	0	0		0			30.3
facies articularis acromialis	100	93.8		94.8			
facies articularis processus coracoidei	54.6	48.7		19.8			
fossa tuberositas glenoidalis	6.32	10.7					0.75
sulcus circumflexus	38	57.8					28.2
foramen suprascapulare	2.41	4.48		3.9			5.92
fossa costoclavicularis	62.9	54.4		19.4			22.7
foramen supratrochleare	18.2	10.8		15.5	14.9		20.6
ossiculum styloideum radii	0	0		0			
facies articularis carpalis partita	20.8	30.8		9			0
ossiculum styloideum ulnae	0	0		0			
incisura radialis partita	3.33	0.9		1.4			0
os coxae: facies articularis sacralis accesoria	20.2	19		7.8			23
synostosis acetabuli incompleta	0	0		0			1.35
facies lunata partita	0	1.08		0			
fossa faciei lunatae	18	17		23.7			29.2
facies Poirei	20	21.7		12.1			14.5
fossa Alleni	11.8	4.12		2.7			36.5
plaque	5.71	17.5		7.9			17.2
facies equestris	23.2	21.4		0			
fossa hypotrochanterica	43.2	47		8.1			16.7
facies Charlesi	92.5	69.3		38			
patella multipartita	0	0		0			0
facies articularis tibiae accesoria lateralis	91.9	47.3		77.7			
facies articularis tibiae accesoria medialis	36.8	5.38		7.7			
facies articularis talaris anterior et media	50.8	43.4		44.8			51.8
facies articularis talaris anterior et media communis	43.3	54		56.9			40.7
facies articularis talaris anterior bipartita	0	0		0.3			
facies articularis talaris media bipartita	0	0		0			
facies articularis talaris anterior absens	5.56	2.63		3.6			0.49
facies articularis calcanea anterior et media	32.6	32.9		16.2			36.6
facies articularis calcanea anterior et media communis	60.6	64.3		83.5			62
facies articularis calcanea anterior absens	6.06	2.82		1.5			
facies articularis medialis talaris	55.9	13.2		3.5			56.7
ossiculum trigonum tali	0	0		0			

TABLE 2. Sex- and age-dependent traits (p – parameters).

	Na Pískách		Vysoká zahrada	
	sex	**age**	**sex**	**age**
sutura supranasalis		0.00002		
lingula frontoparietalis	0.01125			
sulcus frontalis		0.03155	0.00603	
foramen supraorbitale		0.04429	0.02823	
foramen supraorbitale absens			0.01037	
spina trochlearis		0.03416		
os lambdae	0.02114			
ossicula suturae lambdoideae		0.01847		
ossicula occipitomastoidea		0.02441		
processus retromastoideus	0.00236	0.00076		0.00069
torus occipitalis	0.00495	0.00002		0.02559
facies condylaris bipartita		0.00502		0.04875
tuberculum praecondylare	0.01205	0	0.02096	0.04203
processus paracondylaris		0.00052		0.00798
tuberculum pharyngeum		0		0.00403
fossa praepharyngea		0.03310		
foramen hypoglossale partitum incompletum		0.04865		
foramen squamae superior		0.04786		
foramen mastoideum accesorium		0.00631		
foramen tympanicum		0		0
torus acusticus	0.01633	0.04440		
spina suprameatica		0		0
processus postglenoidalis		0		0
foramen Vesalii	0.04280	0.00416		
processus parietalis ossis sphenoidalis		0.00221		
processus marginalis		0.00050		
sutura infraorbitalis		0.01270		
forma anthropina		0		0
forma infantilis		0		0
fossa praenasalis	0.00210	0.00257		
sutura incisiva		0		
foramen mentale multiplex	0.02899			
lingula mandibulae		0.00025		
ossiculum dens axis		0.03125		
C7: foramen processus transversi apertum		0.00635		
ossiculum acromii				0.00020
sulcus circumflexus		0.00022	0.0225	0.00012
fossa costoclavicularis		0.00075	0.00494	0.00195
os coxae: facies articularis sacralis accesoria				0.01827
fossa hypotrochanterica			0.01244	
facies Charlesi				0
facies articularis tibiae accesoria lateralis			0.02889	
facies articularis tibiae accesoria medialis	0.01257			
TOTAL	**10**	**33**	**8**	**16**

TABLE 3. Traits preferring symmetric and asymmetric expression.

	Na Pískách	Vysoká zahrada
symmetry	*processus retromastoideus*	
	tuberculum praecondylare	
	processus postglenoidalis	
	processus marginalis	
	sutura infraorbitalis	
	lingula mandibulae	
	facies articularis acromialis	
	sulcus circumflexus	
	fossa costoclavicularis	
	facies equestris	
	fossa hypotrochanterica	
	facies Charlesi	
	facies articularis talaris anterior et media communis	
	facies articularis calcanea anterior et media communis	
asymmetry	*foramen Vesalii*	
	facies articularis superior atlantis partita	*sulcus frontalis*
	fossa faciei lunatae	*processus paracondylaris*
	facies articularis tibiae accesoria lateralis	*foramen tympanicum*
	facies articularis tibiae accesoria medialis	*spina suprameatica*
	facies articularis talaris anterior et media	*facies articularis processus coracoidei*
	facies articularis calcanea anterior et media	
	facies articularis medialis talaris	
	foramen frontale	
	ossiculum incisurae parietalis	
	foramen parietale inferior	*foramen hypoglossale partitum*
	ossiculum occipitomastoideum	*foramen processus transversi C5 partitum*
	foramen hypoglossale partitum incompletum	*fossa tuberositas glenoidalis*
	foramen infraorbitale multiplex	
	foramen mentale multiplex	
	foramen mentale partitum	

TABLE 4. List of compared populations.

	Time of use	No. of individuals	Author
Na Pískách	8th–11th century	893	
Vysoká zahrada	12th century	129	
Budyně	17th–18th century	716	**Velemínský 1989**
Mikulčice – Kostelisko	7th–10th century	456	**Velemínský 2000**
Pohansko – U kostela	9th–10th century	407	**Hrnčířová 2003**
Virt	7th–8th century	143	**Hanáková – Stloukal – Vyhnánek 1976**
Franzhausen	Early Bronze Age	712	**Wiltschke-Schrotta 1988**

sex-dependent traits, but it is evident that both sex- and age-dependency are more frequent at Na Pískách than at Vysoká zahrada. The only epigenetic variant that is both sex- and age-dependent at both localities is *tuberculum praecondylare* on the occipital bone – it occurs significantly more often in adult skeletons of male sex.

In *Table 3*, there is a list of the traits according to their preference of bi- or unilateral expression. The group of traits which occur significantly more often bilaterally is larger than the group of traits which prefer unilateral expression and can be divided into two parts – in the first there are such traits (14 in total) whose significant bilateral expression is common for both investigated localities, in the second there are the traits whose occurrence is unique in each locality. In opposite, the traits that prefer unilateral expression are absolutely different in each locality.

Table 4 contains the list of localities where the incidences of evaluated epigenetic traits were compared; the incidences (in %) of them can be seen in *Table 1*. *Figure 3* is the result of such comparison, in which we used all evaluated

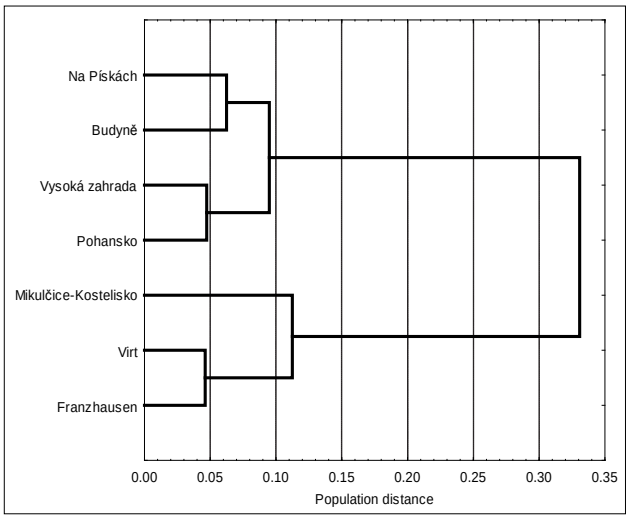

FIGURE 3. Population comparison using all epigenetic traits.

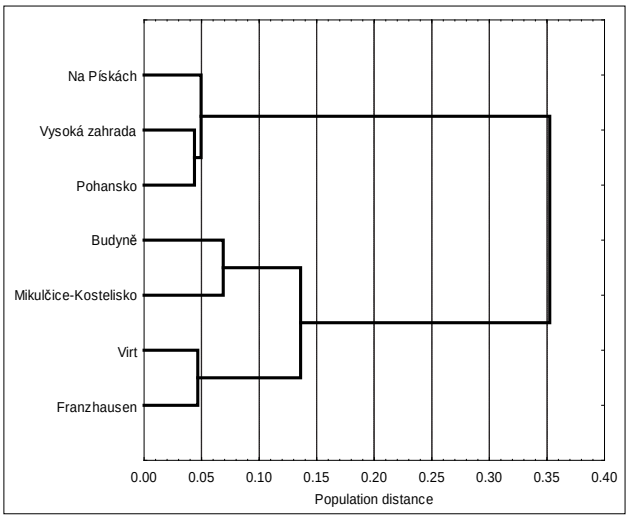

FIGURE 4. Population comparison using cranial epigenetic traits.

epigenetic traits. We can see there two main clusters –the first one comprises the skeletons from both localities by Dolní Věstonice, while the other the Slavonic locality Pohansko – U kostela ("At the Church") and the Modern-time ossuary from Budyně in the Czech Republic. Within this cluster, it is evident that Vysoká zahrada is close to Pohansko (both are cemeteries situated in fortified settlements around the church) and Na Pískách is close to Budyně (these are provincial burial grounds). The second main cluster contains the Slavonic–Avar necropolis at Virt in Slovakia and the Bronze Age locality Franzhausen II in Austria. These burial grounds are both older than those from Dolní Věstonice. The Slavonic Mikulčice–Kostelisko also belongs to this cluster.

To eliminate possible bias of the results with the badly preserved osteological material of the postcranial skeleton, one more dendrogram was made, for which only cranial epigenetic traits were used (*Figure 4*). It has shown some differences from the previous graph – the ossuary from Budyně "moved" from the first cluster to the second, where it made a pair with Mikulčice burial ground. Because the skeletal material from Budyně ossuary included only skulls, we believe this result is more verisimilar than the previous one. There are only Old Slavonic populations in the first main cluster now. The last question is why the Slavonic population of Mikulčice stays outside of the other, similarly dated populations. A cause of this difference can be in the fact that Mikulčice (as one of the most important centres of the Great Moravian Empire) used to be a crossroad of trade roads. This implies higher probability of inter-population contacts and thus higher genetic diversity of people buried there.

It is also necessary to take into consideration that the results can be influenced by the observer who evaluated the epigenetic traits of the material. According to Molto (1979) or Gualdi-Russo *et al.* (1999), inter-observer error is usually significant.

It follows from the clustering that the epigenetic variants are strongly population specific and that they vary a lot even in skeletons coming from the same time period (as are here Slavonic burial grounds), where one could expect similarities. On the other side, the oldest compared sample from Franzhausen is the least similar of all to those from Dolní Věstonice, but the difference is not too significant.

CONCLUSIONS

We performed a research in epigenetic traits at skeletons from two Old Slavonic localities by Dolní Věstonice in the Czech Republic. In the first step, the incidences of each of the 175 evaluated traits were calculated. Then the sex- and age-dependencies of the traits were determined. In both samples, the age-dependent traits are more frequent than the sex-dependent ones. In skeletons from Na Pískách, there are 10 sex-dependent and 33 age-dependent traits, while at Vysoká zahrada 8 sex-dependent and 16 age-dependent traits were found. The only trait which is both sex- and age-dependent for both populations is *tuberculum praecondylare*.

The following research focused on the preference of uni- or bilateral expression of the traits. It has revealed that there are 14 traits preferring symmetric expression, both at Vysoká zahrada and Na Pískách. Except this, there are of course other variants whose bilateral expression is unique for each burial site, but there is no trait whose significant asymmetry would be common for both localities.

The comparison with five other populations showed slightly different results if we used only traits on the skull or on the whole skeleton. Because of bad state of preservation of the postcranial skeletons from both burial grounds at Dolní Věstonice, we consider the comparison of only skulls to be more representative. According to the dendrogram, it is evident that the Slavonic populations (except those from Mikulčice–Kostelisko) are quite similar to one another,

while the groups that are more distant in time and place show also different occurrences of evaluated epigenetic traits. But a significant limit of the above mentioned research in general is the bad state of preservation of the material from Dolní Věstonice (especially the skeletons from Na Pískách), therefore it is not possible to apply these results widely.

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