

## Craniological Series from the Necropolis, Excavated in the North Suburb of the Capital Town Tarnovgrad (Assenov Quarter of Contemporary Town) in Relation to the Results from the Population from “Holy Forty Martyrs” Church, Late Middle Ages, Veliko Tarnovo

*V. Russeva\**, *L. Manoilova*

*Institute of Experimental Morphology, Pathology and Anthropology with Museum, Bulgarian Academy of Sciences*

\* Corresponding author e-mail: [victoria\\_russeva@yahoo.com](mailto:victoria_russeva@yahoo.com)

Craniological study retains its values concerning variation in smaller groups and the appearance of the inhabitants of ancient sites. The very scarce and fragmented material for craniological study from our archeological excavations makes such finds highly valuable. The studied craniological series is provided from the necropolis, excavated in the Assenov quarter in Veliko Tarnovo (13<sup>th</sup> -14<sup>th</sup> c.). It is analyzed in comparison with the results from the series from the “Holy Forty Martyrs” church. Classical methods are used, combined with specially developed for the aims of the research. The studied series presents similar features to the relatively small dolychocranian group from the series from the “Holy Forty Martyrs” church. Differences from the latter series appear mostly in the facial part – broader and more prognatic faces in the necropolis from Assenov quarter. Some features of in the studied series are closer to the observed in the series from previous period.

*Key words:* craniometry, Middle Ages, Veliko Tarnovo

### Introduction

Even if in contemporary science craniological data do not preserve the leading position in answering questions about genetic connections between paleo-populations, craniological study retains its values concerning variation in smaller groups and the appearance of the inhabitants of ancient sites. The very scarce and fragmented material for craniological study from our archeological excavations makes such finds highly valuable, even more so because in many cases they remain singular.

The studied craniological series is provided from the necropolis, excavated in the “Assenov quarter” in Veliko Tarnovo, dated in the last quarter of 13<sup>th</sup> – end of the 14<sup>th</sup> c. [12, 13]. The necropolis was in use in the period in which the medieval town was the capital of the Second Bulgarian Kingdom and was situated in its suburb

area [12, 13]. The studied series originates from the excavated section of its territory, most of which remains uninvestigated. The craniological series adds to our knowledge about the variable population of the capital of the second Bulgarian Kingdom, which until now was only represented by the series from the necropolis around the church of the “Holy Forty Martyrs” [19]. The comparison with the latter is the main aim of this study, in order to establish similarities to some of the groups defined there and expand our knowledge about the anthropological groups, which inhabited the capital in the period. Eventually such an approach would contribute to the identification of different ethnical and social groups in the capital with their specific anthropological appearance and different origin.

## Material and Methods

The craniometrical study is performed based on the methods of Martin-Saller [17]. The horizontal profile of the face is evaluated after the frontomalar and the zygomaxilar angles and depth of the canine fossa after the Alekseev and Debets methods [2]. In addition to the angles of the vertical profile, used in classical methods [17], the feature is also assessed based on the angle between the length of the face and the upper face height, derived from the cosine theorem applied to the linear measurements between the length of the cranial base (basion-nasion), length of the facial section (basion-prostion) and upper face height (prostion-nasion). This measurement is included in the investigation of this series in order to include some of the more fragmented material and to make possible a comparison with the results from the investigation of the series from the “Holy Forty Martyrs” church necropolis. Again in order to be used for correlation with the results from the craniometrical data from “Holy Forty Martyrs” and to include some of the more fragmented material, the length of the hard palate is assessed following the classical methods and additionally as a linear distance between point orale and the palatine suture in the saggital plane.

Sex identification of individuals is achieved based on the available material from skeletons, using macroscopic methods as summarized in: Acsadi and Nemeskeri [1], White and Folkens [24], Walrath et al. [23] with priority placed on the results obtained from pelvic bones. The age of the adults is ascertained by using methods of assessment of the pubic bone’s symphyseal surface relief based on Todd’s scale in: Schwartz [21]; the iliac auricular surface relief based on Ubelaker [21] and the cranial sutures’ obliteration according to the scale in Olivier and Simpson in: Alekseev and Debets [2], compared to the scales of Meindl and Lovejoy [18]. Metrical data are compared to the standard tables of Dwight, Krongman, Thieme and Pearson for diameters of femoral, humeral and radial heads, femoral and humeral bicondylar breadth as summarized in Bass [3] and used in Kühl [16]. Reconstructed pelvic girdle is used in sex identification of 22.73 % of the studied males and 18.18 % of the females, while in rest of the population only pelvic fragments are used [20].

## Results and Discussion

The small number of studied skulls does not allow statistical analysis (**Tables 1-7**).

Nevertheless, it could be pointed out that in some features the studied group represents a relatively uniform population. This conclusion is supported especially in the obtained distribution of categories of some indices: the skull index, which shows a predominance of dolychocranian skulls; the height-length index, with height measured between porion-bregma points, which shows a predominance of skulls with no prevalence of length or height in the proportion; the height-breadth index, measured again between porion-bregma points, which shows a lack of high skulls; the occipito-parietal index, based on which most of the skulls fall into the medium category (**Table 5**). Based on the indexes for the facial area most of the skulls represent broad faces; based on the jaw index the vertical profile is described as prognath; based on the alveolar process of the maxilla and the length-breadth index of the mandible jaws are long-shaped as dolychocranian and dolychostenomandibular (**Table 6, Figs. 1-2**). The face profile presents mostly mesognath skulls, but the small values of the alveolar angle point to the development of prognath alveolar form (**Table 7, Figs. 1-2**). Horizontal profile of the nasomalar angle highly varies, but the zygo-maxilar region presents well-profiled faces (**Table 8**).

In comparison to the series from “Holy Forty Martyrs” the studied group shows close similarity in the proportions of the neurocranium, described in the skull index and indices of height with porion-bregma measurement with the relatively small group of dolychocranean skulls in the King’s court church. The prevalence of broad faces places the series near to the first mesocranean group from “Holy Forty Martyrs”, while all other groups in the latter series present higher faces. In relation to the found broader faces appears the higher incidence of prognath profile of faces in studied series, compared to the one from “Holy Forty Martyrs”. The feature is observed in the values of jaw index and vertical facial angles (facial angle and alveolar angle) and their distribution. From four skulls, which provide data for measurement of the angle between facial length and height only the one from grave N 14 presents values close to the obtained in the “Holy Forty Martyrs”, the other three skulls present significantly lower values. The same situation is observed in jaw index, after which the skull from grave N 14 again approaches to the series from “Holy Forty Martyrs”, while the remaining three skulls present significantly higher values as related to the mean values found in the “Holy Forty Martyrs”. As the dolihocranean group in the series from “Holy Forty Martyrs” the studied one presents close value for orbital index in two cases (males), which stay near to the lower limits of the mesoconch category. Two other skulls (from a male and a female), with relatively low orbits, fall into the chamaeconch category, characteristic for the cited group of skulls in the “Holy Forty Martyrs”, most of the skulls from the other groups in this series show higher orbits.

Craniometrical series with close dating from Bojenishki Urvich [5, 6], North-West Bulgaria, Kavarna – Chirakman [7], North-East Bulgaria, Pernik – Fortress [9], South-West Bulgaria and Kabile - North-West Gate necropolis [11], Perperikon [14] and Tatul [8], in the Thracian region as most widespread are mesocranian skulls like in the series from “Holy Forty Martyrs” unlike the studied series from the “Assenov quarter”. The series from Bojenishki Urvich and the 14<sup>th</sup> – 15<sup>th</sup> century necropolises from Chirakman, Kavarna, Kabile and Pernik show similarities with the cranial series from “Holy Forty

Martyrs” also in regards to the predominance of orthognath vertical face profiles in contrast to the relatively prognath forms in the studied population. Bojenishki Urvich and Kabile present low values of the zygo-maxillar angle of the horizontal profile, as established for both series from Veliko Tarnovo. Results, obtained for craniometrical series from the earlier period, 11<sup>th</sup> – 12<sup>th</sup> century CE – from Kovachevo [10] and Pliska [4] (male population) present closer values to the dolihocranial group from the “Holy Forty Martyrs” and the one from the “Assenov quarter”. The distribution of cranial index in Odartsi 1 and 2 [15, 25] also presents bigger portions of dolihocranial and brachycranial skulls, while the relative number of mesocranian skulls remains significantly lower as presented in “Assenov quarter” as opposed to the ones from “Holy Forty Martyrs”.

## Conclusions

The studied series presents features that are more similar to the relatively small dolihocranial group from the series from the “Holy Forty Martyrs” necropolis. Differences from the latter series appear mostly in the facial part – with broader and more prognath faces in the necropolis from the “Assenov quarter”. Some features of the studied series are closer to the ones observed in the series from the earlier period. It could be supposed that the series from King’s court church presents more variation in types of features obtained by the population after intense mobility with political, social and clerical duty. In contrast, the group, which buried its dead in the necropolis in the “Assenov quarter” retained features, characteristic for the earlier period and possibly was more static, having less contacts with other populations.

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**Table 1.** Basic skull linear measurements and corresponding indices, neurocranium, males and females, Assenov quarter, Veliko Tarnovo. Gr. N – grave number; No – number by Martin-Saler [17]; 8:/ – correlated measurements in the index by Martin, Saller [17]

Measurements and indices	No		Males, Gr N						Females, Gr N			
			11	14	16	22	27	35	9	10	33	37
Measurements	Cranial length	1	200	176	-	182	182	-	189	176	186	169
	Cranial breadth	8	149	147	-	136	128	-	133	150	134	141
	Cranial height	17	151	127	-	137	-	-	140	123	126	-
	Cranial height (po)	20	-	107	-	-	-	-	120	-	111	116
	Cranial height (po-br)	-	116.5	105.5	-	-	107	109	119	108	-	-
	Smallest frontal breadth	9	103	89	93	97	83	100	98	98	96	100
	Occipital breadth	12	120	112	-	108	101	-	110	115	105	107
	Cranial base length	5	110	98	-	96	127	-	103	-	100	-
	Cranial index	1:8	74.5	83.52	-	74.73	70.33	-	70.37	85.23	72.04	83.43
	Hight-length index	17:1	75.55	72.16	-	75.27	-	-	74.07	69.89	67.74	-
Indices	Hight-breadth index	17:8	101.41	86.39	-	100.74	-	-	105.26	82	94.03	-
	Hight-length index (po)	20:1	-	60.8	-	62.64	-	-	62.96	-	59.68	-
	Hight-breadth index (po)	20:8	-	72.79	-	83.82	-	-	89.47	-	82.84	-
	Hight-length index (po-br)	-	58.25	59.94	-	59.62	58.79	-	63.49	61.36	59.41	68.64
	Hight-breadth index(po-br)	-	78.19	71.77	-	79.78	83.59	-	90.23	72	82.46	82.27
	Fronto-parietal index	9:8	69.13	60.54	-	71.32	64.84	-	73.68	65.33	71.64	70.92
	Occipito-parietal index	12:8	80.54	76.19	-	79.41	78.91	-	82.71	76.67	78.36	75.89

**Table 2.** Basic skull linear measurements and corresponding indices, facial part, males and females, Assenov quarter, Veliko Tarnovo. Gr. N – grave number; No – number by Martin-Saler [17]; *♂:!* – correlated measurements in the index by Martin, Saller [17]

Measurements and indices	No	Males, Gr N						Females, Gr N			
		8	11	14	16	22	27	35	9	33	37
Facial length	40	-	-	90	-	99	-	-	103	101	-
Facial breadth	45	-	-	133	-	-	122	-	121	123	-
Upper face breadth	43	-	116	103	104	96.5	104	104	103	105	104
Zygomatic breadth	46	92	-	98	84	88	98	98	91	98	95.5
Facial height	47	-	-	111.2	-	110	-	-	106	100.5	109
Upper face height	48	-	-	63.4	-	67.2	66.8	-	67	63	61
Face index	47:45	-	-	83.61	-	-	104.1	-	86.6	81.71	-
Upperface index	48:45	-	-	47.67	-	-	54.75	-	55.37	51.22	-
Face index(Virhov)	47:46	-	-	113.47	-	125	129.57	-	116.48	102.55	114.14
Upperface index (Virhov)	48:46	-	-	64.69	-	76.36	68.16	66.12	73.63	64.29	63.87
Jaw index	40:5	-	-	91.84	-	103.12	-	-	100	101	-
Orbital breadth	51	-	-	40	45	41	41	42.7	39.1	41	40
Orbital height	52	-	-	34.5	34.4	42	31.2	29.5	35.5	28.5	32
Orbital index	52:51	-	-	86.25	76.44	-	76.1	69.09	90.79	69.51	80
Nasal height	55	-	-	46	54.3	51	50	51	49	49	51
Piriform aperture breadth	54	22	-	23	24	24	26.4	26	26.5	27.5	22.4
Nasal index	54:55	-	-	50	44.2	47.06	52.8	50.98	54.08	56.12	43.92
Nasal bones breadth	57	-	13	9	10	10	9	9	12	10	11
Nasal bones height	-	-	4.5	6	5.5	5	5	5.5	6	3	5.5
Nasal bones length	56	-	-	-	-	-	21.5	-	23	-	-
FC	-	-	-	5.5	4.6	3	4.5	4	2.5	4	7
Alveolar process height	48.1	19.5	-	18.2	-	-	-	14	19	-	10
Palatine length	62	49	-	45	-	53	45	-	-	52.1	45.5
Palatine breadth	63	35	-	35.5	-	40	35.5	39	37	59.5	37
Palatine, anterior length	AL	37	-	35	-	37	38	41	-	43	39
Palatine index	62:63	-	-	-	-	75.47	78.89	-	-	114.2	-
Palatine index (anterior)	62:AL	-	-	-	-	108.11	93.42	112.97	-	138.37	-
Maxilla, alveolar process length	60	52.5	-	54.5	-	50	5	44.7	52.5	47	45
Maxilla, alveolar process breadth	61	57	-	59.5	-	59.5	56.2	63.6	59	35.5	63
Maxillar index	61:60	-	-	109.17	-	119	112.4	142.28	88.98	75.53	140.0



**Table 3.** Basic skull facial angle measurements in degrees, horizontal and vertical profile, males and females, Assenov quarter, Veliko Tarnovo. Gr. N – grave number; No – number by Martin-Saller [17]

Measurements	No	Males, Gr N						Females, Gr N					
		8	11	14	16	22	27	35	9	10	33	37	
Nasomalar angle	77	-	162	135	148	-	145.5	136	141	135	141	152.5	
Zygomaxilar angle	-	125	-	140	127	122	126.5	131	122	-	129	128	
Face Angle	72	-	-	83	-	75	84	-	81	-	82	-	
Ba-n-pr angle	-	-	-	77.27	-	67.46	-	-	70.31	-	70.87	-	
Nose angle	75	-	-	60	-	42	59	-	46	-	-	-	
Alveolar angle	74	-	-	68	-	65	69	-	71	-	77	-	

**Table 4.** Basic skull measurements, in mm and indices, mandible, males and females, Assenov quarter, Veliko Tarnovo. Gr. N – grave number; 8:I – correlated measurements in the index by Martin, Saller [17]

Measurement and indices	Males, Gr N												Females, Gr N					
	6	8	11	14	16	22	24	27	35	9	10	31	33	37				
Symphiseal height	23.5	32	35.5	25.5	29	33	29	32	29	30.5	29.5	32	26	29.1				
Breadth at mental foramen	10.8	11	11.1	10	10	10	19	10	11.5	-	10	9.5	13	11.1				
Bigonial breadth	106	112	118	105	106	100	113	81	-	94	93	96	91	105				
Mental breadth	44	41.5	49.2	41.5	42	-	48	41	43.5	40.5	47	42.5	47.2	-				
Projection length	81	78	85	72	75	72	83	80	75	82	77	71	74	72				
Branch height	65	-	74	56	56	49	64	62	62	61	57	57	57	55				
Branch smallest breadth	32	32	33.4	27	25*	29*	-	34	34.6	32	31	22.5	31	26.8				
Mandible angle (in degrees)	120.5	132	115	127	124	141*	131	115	133	111	120	119	122.5	127				
Coronial breadth	-	100	139	91	106	95	-	91	-	96	98	95	10	100				
Condilar breadth	-	-	-	-	-	-	-	111	-	119	-	115	113	-				
Length-breadth index	-	-	-	-	-	-	-	72.07	-	68.91	-	61.74	65.14	-				
Breadth index	-	-	-	-	-	-	-	72.97	-	78.99	-	83.48	80.53	-				



**Table 5.** Distribution of studied skulls after main indices of cerebral section of skull, males and females, Assenov quarter, Veliko Tarnovo; N – number of measured skulls

	Skull index, 8:1			Height-length index			Height-breadth index			Fronto-parietal index 9:8			Occipito-parietal* index 12:8						
	Dolicho-cranian	Brachy-cranian	Hyperbrachy-cranian	N	chamae-cranian	ortho-cranian	Chypsi-cranian	N	tapino-cranian	Metro-cranian	Acrotra-nian	N	Stenome-top	Metrome-top	Eury-me-top	N	Medium	High	Very high
M	4	3	1	-	3	1	2	3	1	-	2	4	1	1	2	4	2	2	-
F	4	2	1	1	3	1	-	3	1	1	1	-	-	-	-	4	3	-	1
Tt	8	5	2	1	6	1	2	6	2	1	3	4	1	1	2	8	5	2	1
M	/	/	/	/	4	-	-	4	3	1	-	/	/	/	/	/	/	/	/
F	/	/	/	/	4	-	2	4	1	2	1	/	/	/	/	/	/	/	/
Tt	/	/	/	/	8	-	6	8	4	3	1	/	/	/	/	/	/	/	/

**Table 6.** Distribution of values and means of main indices of facial section of skull, males and females, Assenov quarter, Veliko Tarnovo; N – number of measured skulls

	Upperface, 47:45			Upperface, 48:46 Vithow			Jaw, 40:5			Orbital, 52:51			Nasal, 54:55			Palatin, 63:62			Upper jaw 61:60		Lower jaw 68:65						
	eurten	mesen	lepten	N	hyperchamaeprosop	chamaeprosop	orthoprosop	N	orthognath	prognath	N	chamaeconch	mesoconch	hypsi-conch	N	leptorhinian	mesorhinian	chamaerhinian	N	leptostaphylin	brachystaphylin	N	dolihouran	brachyuran	N	Dolichostenomandibular	
M	2	1	1	-	4	1	2	1	4	1	3	1	2	1	5	1	3	1	3	3	3	3	3	3	-	2	2
F	2	-	1	1	3	2	1	-	2	2	1	1	1	1	3	1	-	2	1	1	1	1	2	1	2	2	2
Tt	4	1	2	1	7	3	3	1	6	1	5	2	3	2	8	2	3	3	3	4	3	1	3	5	1	4	4

**Table 7.** Distribution of values of angle measurements, males and females, Assenov quarter, Veliko Tarnovo; N – number of measured skulls

	Face			Alveolar			Nasomalar angle						Zygomaxilar angle					
	N	prognath	mesognath	N	small	medium	big	N	very small	small	medium	big	very big	over very big	N	very small	small	medium
M	3	1	2	3	3	-	-	5	1	1	-	2	-	1	6	1	3	2
F	2	-	2	2	-	1	1	4	1	-	2	-	1	-	3	1	2	-
Tt	5	1	4	5	3	1	1	9	2	1	2	2	1	1	9	2	5	2



**Fig. 1.** Skull, frontal, right lateral, occipital and vertical view, grave N 27. Male, 60-65 years at death



**Fig. 2.** Skull, frontal, left lateral, occipital and vertical view, grave N 33. Female, 40-50 years at death