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Paleodemographic and paleopathologic data of late antique population of Augusta Trayana

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Paleoanthropological material from the southern necropolis of the ancient town of Augusta Trayana has been examined. By means of paleodemographic analysis and examination of pathological changes in the bones of 370 individuals (107 children, 33 adolescents, 118 females, and 112 males) the authors study the demographic situation, the frequency of occurrence and the course of some inflammatory, degenerative and infection diseases, as well as the dental – maxillary paleopathology and the traumatic injuries, characteristic of the period and the examined population in particular.

Key words: paleodemography, paleopathology, Late Antiquity, Thracian lands.

The southern necropolis of Augusta Trayana, sited 150 m away from the fortified wall of the ancient town, has been discovered in 1976-77 during rescue excavations in the center of Stara Zagora. Graveplots, stone tombs, vaults and communal graves, 264 in all, dated 2-5 c. A. D, have been studied. The peculiarities of the grave fittings give the base to presume that most of the buried are ordinary town population of Augusta Trayana [4]. Race-type analysis gives stressed superiority of the Southeuropean race stem with 54,4% Mediterranean and 7,2% Protomediterranean race types [3]. That fact, as well as the names on tomb's inscriptions, testify to the presence of compact mass of Thracian population in the Roman town of Augusta Trayana, that has kept some of its ethnical customs up to the Late Antiquity.

The purpose of the present study is to expand the notion of conditions of life and social situation of the population of Augusta Trayana, great administrative center in Roman province Thracia, using paleodemographic analysis and examination of pathologic changes in bone-joint system.

Material and methods

The anthropologic study covers skeletons of 370 individuals: 107 children, 33 adolescents, 118 females, and 112 males. The demographic indices, used as a base

for the present analysis, are calculated by the method of Acsadi and Nemeskeri [1]. The tendencies of demographic processes' course are best revealed in four of them: "relative death frequency" (d_x), "further expected life span" (e_x), "life expectancy" (l_x), and "risk of dying" (q_x).

Paleopathologic data are obtained by macroscopic and X-ray examination of skulls and postcranium skeletons. Odontologic investigation is carried out on 545 dentitions, with 9276 teeth available, including 133 children's dentitions with 1491 milk teeth. Caries frequency (CF), caries intensity (CI), and index of cariosity (IC) are calculated.

Results and discussion

Paleodemography. Demographic processes, directly connected to the social development, reflect not biological events only, but cultural history of any people also. The term "average life expectancy" is defined by UNO as forthcoming duration of life for new-borns (e_0), which for the group investigated is 31,34 years. That index must be carefully interpreted and considered in paleoanthropologic investigations because of the highly varying number of children's skeletons. Child mortality in Augusta Trayana population is 29%, and having in mind the relatively low part of 0-1 year-old children, its real value is probably over 40%, that is, life duration is lower. The index e_{20-24}, being further expected life span of adults, is more reliable. It is expected persons aged twenty to live 24,54 years more, and to reach about 40 years age. Female's life duration is below average level, and 5 years less than male's (27,41 years). Considering the interrelation between sexes, the greater number of males of mature and senile age makes an impression (Fig. 1), and that is a distinguishing feature, characteristic for the Antiquity. There are 47 females to 75 males at the age over 45 in the population studied. The same tendency can be followed on the diagram of relative death frequency: female's curve has two peaks, first maximum at 35 years and the second at the interval 50-55 years (Fig. 2); male's curve forms only one maximum only after 50. The greatest intersex differences are observed at the age of till 40. 46,6% of all the females get into that interval, while the males are 24,10% into it. The variations of the values of q_x index, indicator of risk of dying at definite age for a person, are in support of these data (Fig. 3). The index for males starts to increase not until 40-45 years, while female's index is three times greater at 30-40 years. The difference diminishes gradually in the next age intervals, and after 55 the probability to die is higher for males. That peculiarity is observed for other populations of Antiquity [5] and Middle Ages [6], and reflects a common regularity in demographic processes. Comparing the demographic situation in Bulgarian lands with that of other European countries, we find conformation of this tendency. The indices for free town population of ancient Rome, are closest to our results, further expected life span (e_{20}) being 25,2 years in average (26,9 for males and 23,4 for females), as can be seen from the published data [1]. Though we could expect higher level of civilization in bigger settlements of the Roman empire, as Augusta Trayana and Abritus on our lands, the results show that the still insufficient development of medicine could not prevent complications in pregnancy and parturition, as well as the heavy, some times epidemically passing, diseases, specific for the childhood. These are the main reasons for higher mortality of young females and of high child mortality not only in early

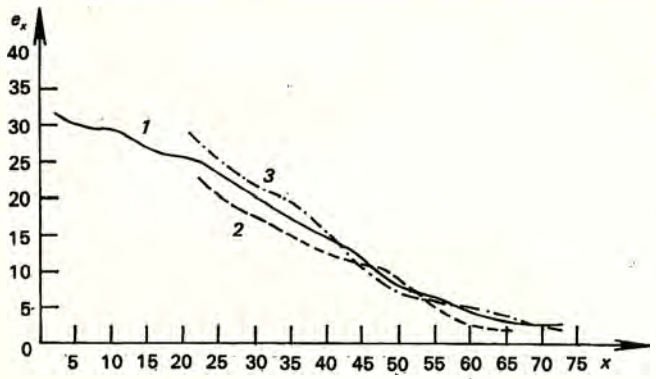

Fig. 1. Further expected life span
1 – 00+♂♂+♀♀; *2* – ♀♀; *3* – ♂♂

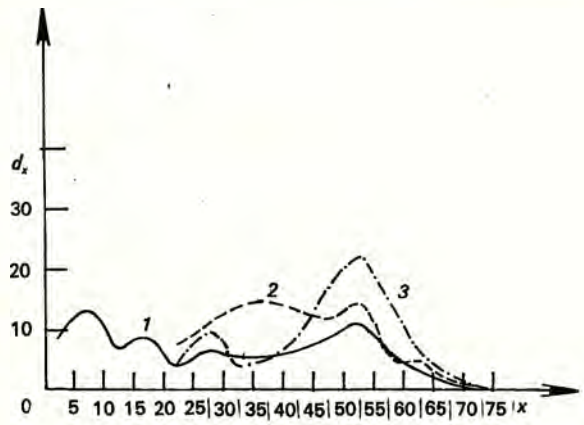

Fig. 2. Relative death frequency in various age intervals
1 – 00+♂♂+♀♀; *2* – ♀♀; *3* – ♂♂

childhood, but in the interval between 5-9 years too. 47% of all the children at the age of 0-14 years get in that interval. Life expectancy (l_x) confirms these data – only 51,89% of the population have reached 30 years.

Paleopathology. Proof of different disease's dissemination are the morphologic changes of bones. Degenerative-distrophic processes, inflammations, traumatic injuries, as well as some common diseases, have left specific traces on the skeletons. Spondyloarthrosis changes are discovered in 12% of adult individuals (Fig. 4) that are the most often diagnosed disease of the group of chronic degenerative processes [2]. Light and middle heavy forms of course are prevailable. X-ray grams show congestions at the edges of vertebrae, converting in osteophates. The deformations of small joints, formation of bone clamps, ossifying of longitudinal ligaments and knitting of neighbour vertebrae are more rare. The heavy arthrosis changes of big joints are rather exceptions, being most often consequence of traumatic injuries. That is the case with chronic deformation osteoarthrosis coxae, developed after heavy injuries fracture of both cruris bones (Fig. 5).

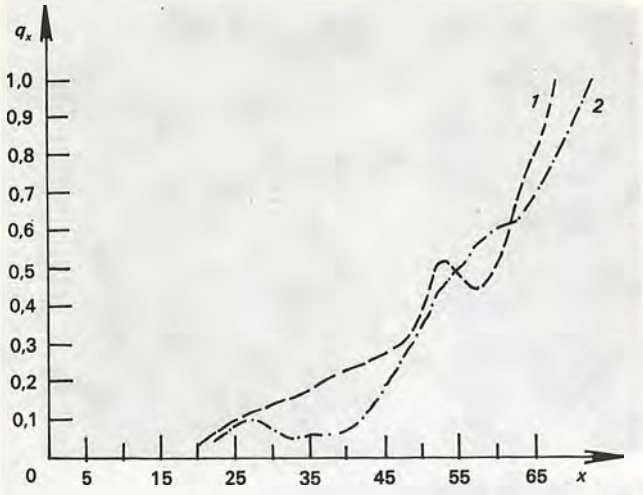

Fig. 3. Risk of dying in various age intervals
1 – ♀♀; *2* – ♂♂

Fig. 4. Chronic deformation spondyloarthrosis

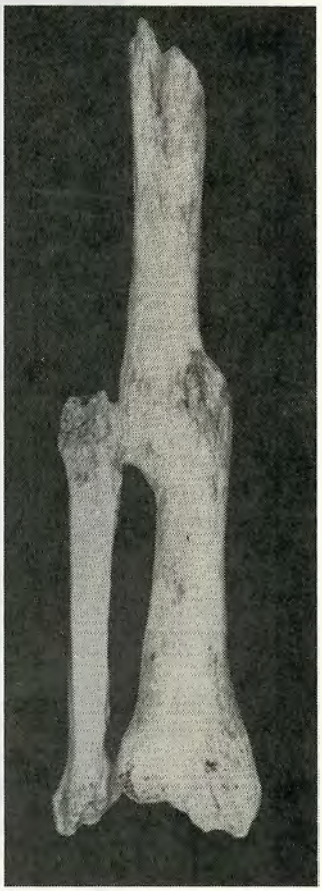

Fig. 5. Complicated fracture of cruris bones

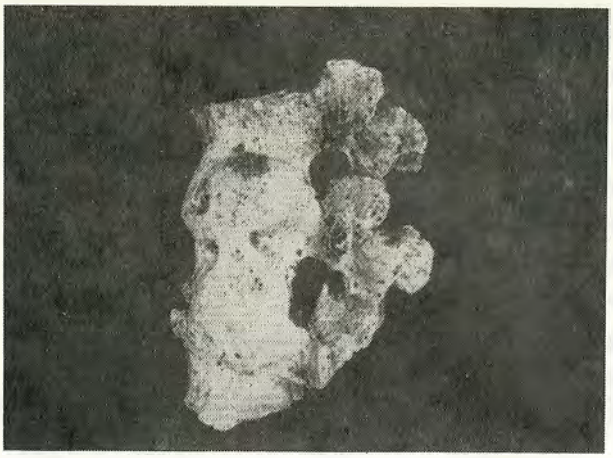

Fig. 6. Chronic tubercular spondylitis

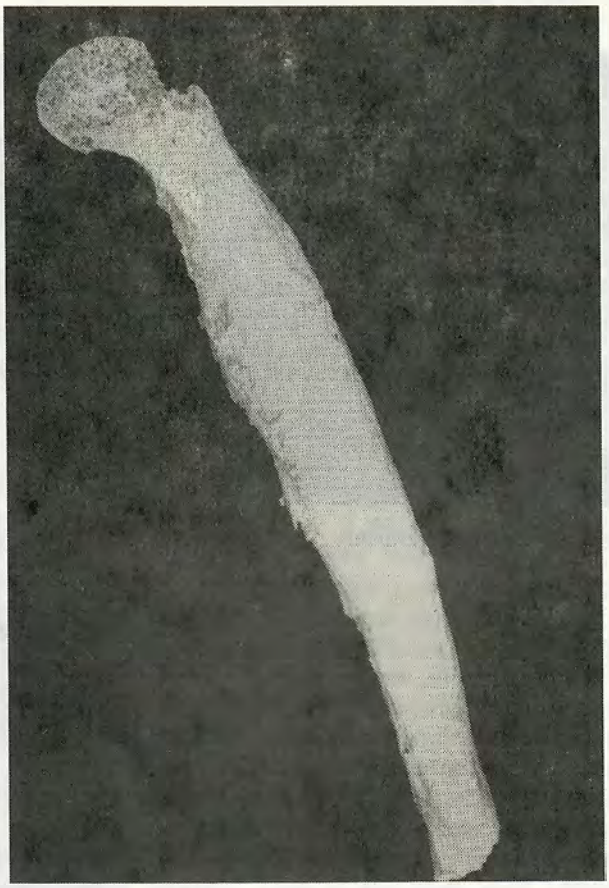

Fig. 7. Chronic osteomyelitis

Fig. 8. Tumour-like formation in skull bones

Inflammable processes, causing specific changes in bone structure, must be mentioned as a separate group. Tubercular-spondylitis and chronic osteomyelitis are found as separate cases (Fig. 6, Fig. 7). Chronic post traumatic periostitis are more frequent. In some cases arthrosis changes of big and small joints are combined with inflammable process and have heavier course, causing deformations and ancilosis.

Osteohondrom of femoral bone and osteom of ribs, tumour-like formations are diagnosed. The X-ray data for a case of forbregmatic tumour formation with irregular form (Fig. 8) give indication for a malignant process.

The traces of skull-brain traumae are not frequent. Only two cut injuries are penetrating in depth, not showing healing, being the probable cause of death (Fig. 9).

Except for the described disease changes, observed in paleoanthropological studies the investigation of population of Augusta Trayana gives information about some more rare diseases too. The high frequency of symmetric orbital

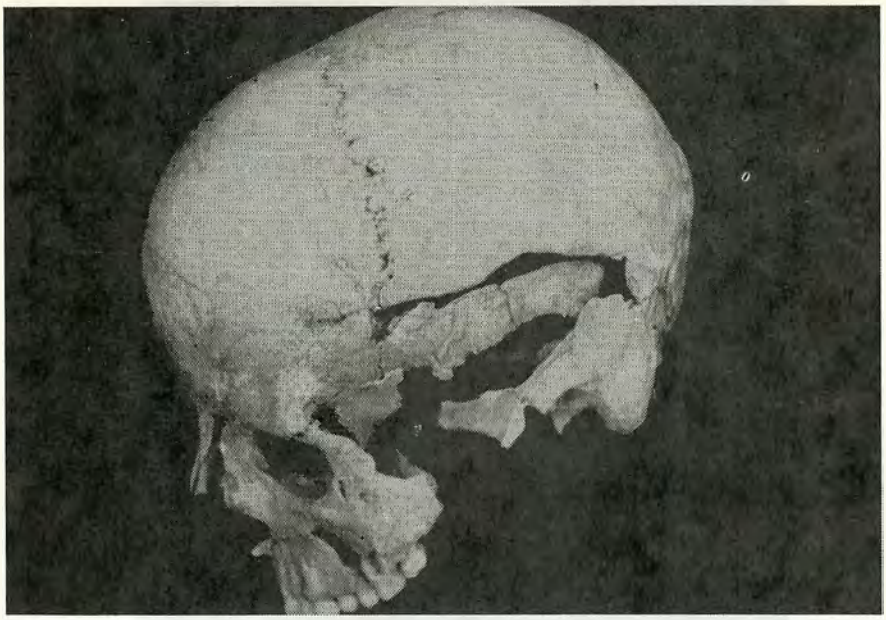

Fig. 9. Traumatic lesions in parieto-accipital region of skull

osteoporosis – 10 cases, half of which are in second and third stage of development – cribra orbitalia porotica, cribra orbitalia trabecularis, is notable. These morphologic changes indicate serious illness – congenital haemolytic anaemias of talassemia type – having lethal end between 14 to 18 years.

Another characteristic peculiarity is the presence of data about outbreak of an epidemic. Detail investigation of grave fittings, communal graves (containing 5 and more skeletons) and the mass tomb (more than 40 buried) discounts war battles and big fires as a reason. Age-sex structure of the studied individuals corresponds to demographic structure of the population – 37% children, 35% females and 27% males. That data, as well as the lack of traces of violent death, guide to assumption of heavy epidemic disease that struck the population of Augusta Trayana near the end of 5 c. A. D.

Tooth-maxillary paleopathology. The population studied is notable for relatively high cariosity – CF = 50,24, CI = 7,17 and IC = 3,60. The caries is met in milk teeth in early childhood yet. Caries damages of constant teeth appears in children yet, and gradually increase with age. The quik development of carious process is typical of the population studied (Table 1). Half of the carious teeth are roots, and in one third complications in tooth adjoining tissues exist (granulomatous lesions and cysts). Anomalies in teeth number and situation, as well as maxillar fractures, are rare in the dentitions studied.

Conclusions

1. The results of paleodemographical and paleopathological study give information of relatively good living standard of the population.

Table 1. Stomatological status of skulls from Augusta Trayana's necropol. Permanent teeth

Age group	Sex	Total number of skulls	Available teeth	Teeth lost post mortem	Teeth lost ante mortem	Tartar	Alveolar atrophy	Tooth abrasion	Superficial caries	Medium profound caries	Profound caries	Roots	Carious teeth	Skulls with carious teeth	Granulomatous lesions	Cystous lesions	Ideal amount of teeth	Actual amount of teeth	Caries intensity	Caries frequency	Index of cariosity	Archaeological dental index
Infans II	—	77	838	142	—	0,09	—	—	5	1	—	—	6	6	—	—	980	980	0,72	7,79	0,06	85,81
Juvenis	—	45	985	281	—	0,65	—	—	5	3	1	—	9	7	1	—	1266	1266	0,91	15,55	0,14	77,80
Adultus	♀	68	1526	573	70	1,27	1,51	1,68	52	11	12	15	90	39	12	—	2169	2099	5,90	57,35	5,90	72,70
	♂	38	885	294	36	1,35	1,51	1,67	19	11	10	17	57	21	14	—	1215	1179	6,44	55,26	3,56	75,06
Maturus	♀	75	1430	635	331	1,50	2,61	3,26	22	31	34	89	176	56	53	5	2396	2965	12,31	74,67	9,19	69,25
	♂	82	1737	590	297	1,47	2,55	3,37	36	19	33	85	173	58	51	14	2624	2327	9,96	70,73	7,04	74,64
Senilis	♀	13	179	60	177	1,54	2,96	3,88	1	1	2	19	23	19	12	1	416	239	12,85	76,92	9,88	74,89
	♂	14	205	86	157	1,53	2,68	3,93	—	2	4	18	24	10	11	2	448	291	11,71	71,43	8,36	70,45
Total		412	7785	2661	1068	1,09	1,56	1,93	140	79	96	243	558	207	154	22	11 514	10 446	7,17	50,24	3,60	74,53

2. The development of demographic processes obeys a general tendency, common for Late Antique and Middle Age population in whole Europe.

3. The high frequency of symmetrical orbital osteoporosis, connected to congenital haemolytic anaemias, is a characteristic peculiarity.

4. The population of the Roman town of Augusta Trayana has been struck by heavy epidemic disease in the end of its existing.

5. Paleodemographic and paleopathologic study of Augusta Trayana's population reflects the demographic situations in Thracian lands in the end of Antiquity and, in fact, represents a stage of demographic history and social development of the population living on the territory of contemporary Bulgaria.

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