

Osteological and Osteometric Studies on Dog Skeletons of the Dolichocephalic Type

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On 24 dog's skulls from different breeds were taken 7 measurement and 4 indices between them. The differences between the important craniometric features of the skull (crista sagitalis externa, the form of foramen magnum and foramen infraorbitale, the outer relief of os parietale) were analyzed.

Key words: skull, osteology, craniometry, dog.

Introduction

In the recent several years, the number of dogs bred as pets has grown drastically. The number of the guard dogs have increased as well as those used for hunting. However, the breeding varieties and the interbreeding crosses have enriched and diversified enormously. The fact that recently attempts are made for creation of Bulgarian breeds (e.g. the Bulgarian Karakachan and the Bulgarian shepherd dogs) based on mainly selectioning activities is also of importance. The dog head is one of the most important parts of the body since it serves the tasks of type defining (long-headed, short-headed) and age-defining by the teeth, etc. In the literature, there is no clear consensus on the issue concerning those dogs that are found between the long-headed and short-headed types. Some authors [8] designate them as intermediate types while others [1, 2] specified a third type – the mesocephalic one (mesaticephalic). Other authors [3] defined alter the structure of body and shape of head a total of six dog types like the Great Dane, hound, hunter dog, fox, dachshund and crosses. In his studies on the variability of foramen magnum in short-headed and long-headed dog breeds and in adult Pekingese *Simons et al.* [6, 7] has established that the size of the big foramen displays a great variability but without correlating it to the age and breed statistically. Following through craniometric investigations on the skeletons of heads of adolescent German shepherd dogs (Asian type), *Onar et al.* [4] have established that with age the values of all sizes tend to increase while the values of the indices decrease. Besides, a statistically insignificant difference between skull volume and weight has been found. Later on *Onar et al.* [5] again based on comparative craniometric studies has defined the Kangal dog (a well-known Turkish shepherd from the identically named area in Central Turkey) as a typical

breed of the dolichocephalic type. Up till now there are no systematic osteological and osteometrical investigations carried out in Bulgaria on the type and breed dog composition in the country and such pertaining to the head skeleton. This fact encouraged us to undertake the present preliminary study aimed at the laying of the foundations for systematic and detailed osteological and osteometric studies both on the head skeleton as a whole and on different bones of the skull in dolichocephalic dogs.

Material and Methods

Twenty-four dog head skeletons were used, 18 of them belonging to individuals of different breeds as follows: pinscher – 3, dachshund – 2, poodle – 1, drahthaar – 1, braque – 1, collie – 2, German shepherd – 1, Caucasian shepherd – 1, Belgian shepherd – 1, Great Dane – 4, sharplaninac – 1. Another 6 dog skeletons of unknown breed which have not been home pets but obtained from the dog-kennel of Stara Zagora municipality.

All head skeletons were taken from deceased dogs, which after skinning were rinsed in running water for several hours. After that the heads were boiled, cleared from soft tissues and dried at room temperature for 48 hours, after they were defatted in a mixture of ether and chloroform (1:1) for 12 hours and were embellished in a 4 per cent solution of hydrogen peroxide (H_2O_2) for 24 hours.

All head skeletons were subjected to osteological and osteometric studies. Special attention was made to the profile line of the head at the level of sutura frintonasalis and fossa frontalis, crista sagitalis externa, the alter relief of os parietale and shape of foramen infraorbitale. The following measurements were included in the osteometric studies:

- Length of head (SL) – from protuberantia occipitalis externa (inion) to the front edge of the incisor bones along the median line of the head (prosthion).
- Width of head (SW) – the distance between the farthest, symmetrically situated points of arcus zygomaticus (zygion).
- Length of skull (CL) – from inion to the most caudal point of the two nasal bones in the median headline (nasion).
- Length of face (FL) – from nasion to the front edge of the nasal bones (rhinion)
- Height of the big aperture (MH) – between the farthest proximal and distal points of the aperture in the median headline.
- Width of the big aperture (MW) – between the most laterally located points of the big aperture.
- Length of the suborbital canal (IL) – from fossa sacci lacrimalis to the lateral edge of the aperture.

After the measurements made, the following indices were determined for each skeleton: SL/SW; CL-FL; MH-MW and IL-FL.

Results and Discussion

The results from osteological and osteometric studies showed that there are certain differences in the head's skeleton some of which rather demonstrative. The more important ones are as follows:

The profile line of the head's skeleton was almost straight in the collie while in the other breeds a denture was observed (i.e. a breakage of the line) expressed to a different degree (Fig. 1). The strongest such in dentition was found in the three breeds of the shepherd dogs – German, Caucasian and Belgian the most strongly pronounced being recorded in the case of the Caucasian shepherd (Fig. 2).



Fig. 1. Profile line of the collie head skeleton

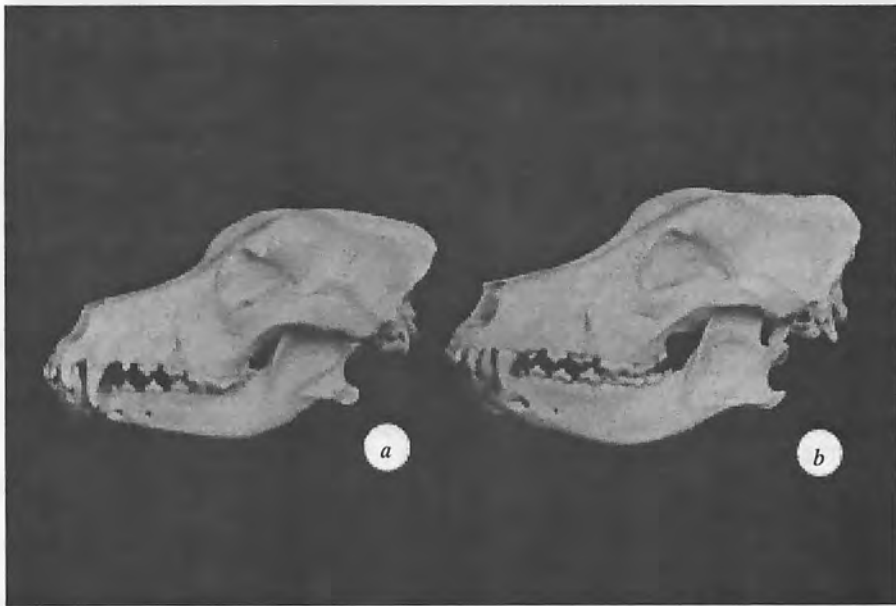


Fig. 2. Profile line of the head skeleton of Caucasion shepherd (*a*) and shepherd dog (*b*)

Crista sagitalis externa was roughly convex in its relief and best outlined in the Great Dane's head skeleton while in those of the Caucasian shepherd and the sharplaninac it was less pronounced (Fig. 3). In the pinscher, poodle and dachshund it is weakly marked and was hardly visible being developed only in the portion of the interparietal bone. Further on from the interparietal bone in the area of the parietal and frontal bones

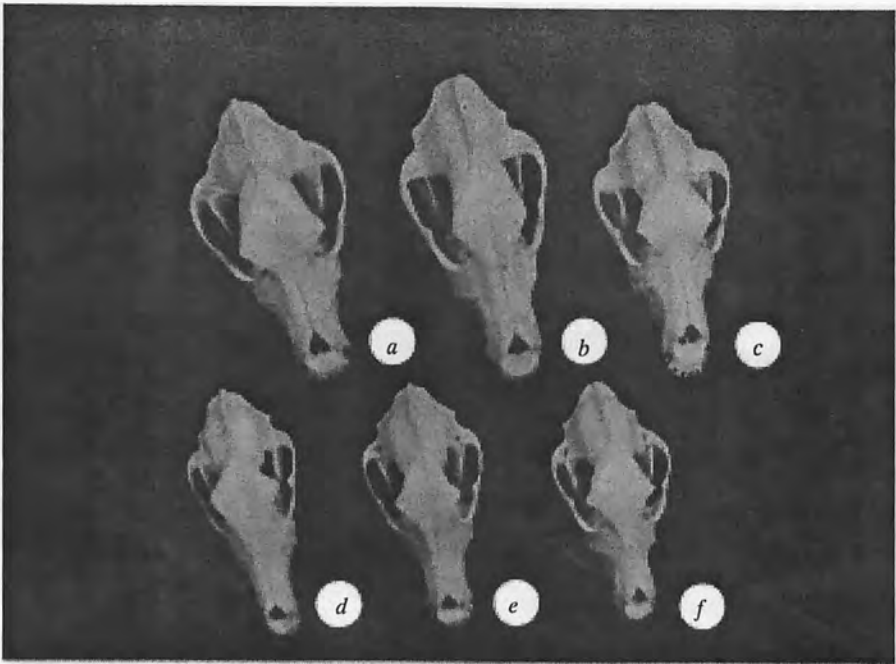


Fig. 3. Vertical line of the head skeleton of dog (♀)(a), shephesd dog (b), Caucasian shepherd (c), drahthaar (d), German shepherd (e) and collie (f)

and area significantly greater in sizes was established which was bilaterally confined by linea temporalis. By contrast with the other breeds in the pinscher and poodle linea temporalis starts individually away from the crista sagitalis externa and forward gradually diverging to processus zygomaticus of the frontal bone. In the dachshund the temporal line is hardly visible and is not consistent either, i.e. it is no prolongation of crista sagitalis externa. Besides both lines were initially closely situated to crista sagitalis externa. Their divergence initiated only at sutura coronalis. The outer relief of os parietale varied from altogether smooth in the pinscher and poodle breeds to a rather rough one in the shepherds due to the presence of crest-like and less sharp heights related to the insertion of m. temporalis. As is well known the strongest chewing muscle in the dogs is m. temporalis and the availability of crests differing in size can be attributed to the power of the muscle, and the strength of the bite respectively.

The shape of foramen magnum was almost round in the pinscher while in the other breeds and in the stray dogs, it was transversely oval.

Foramen infraorbitale in the various breeds and in the random bred ones was of a shape from ellipsoid to one resembling very much and equal-sided triangle.

The values of the SL/SW index (head index, [1]) were highest for the pinscher – 61.46; shepherd – 53.79; the Great Dane – 53.12; and in the collie it was lowest – 42.87.

Almost in the same sequence were also the values of CL/FL (craniofacial, [1]) – poodle and pinscher – 1.23; the dachshund – 1.13 stray dogs – 1.10 and the Great Dane – 1.06. The lowest was the one established for the collie – 0.92.

The values of MF/MW were in the following order: pinscher – 1.03; poodle – 0.99; stray dogs – 0.75 and the Great Dane – 0.71.

The values of IL/FL were highest in the collie and the German shepherd – 0.40 and lowest in the pinscher – 0.24. In the Great Dane, the German breed and the stray dogs

the values of this index were 0,30, while in the other breeds they were as follows: 0,25 – the poodle; 0,27 – the dachshund; 0,28 – rottweiler and the Caucasian shepherd, drahthaar – 0,31 and 0,32 – the sharplaninac. Although the studies thus whose carried out are still in an initial faze the osteoscopic and osteometric measurements give enough grounds to assume that the stray dogs (random bred, homeless) yield the most stable indices mostly for the profile line of the head, the shape crista sagitalis externa etc. Also, on the basis of the obtained results it can be admitted that the skeleton of the stray dogs is closest to the one of the dog from the dachshund breed.

Future investigations on a grater amount of material would doubtlessly enrich the data and deepen our knowledge in that very up-to-date field of dog anatomy and craniology.

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