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COMPARATIVE STUDIES OF THE NEUROCRANIUM FOR DIFFERENT SPECIES OF WILD ANIMALS

Alexandra BLENDEA, Cristian Sergiu BĂRDAŞ, Flaviu TUNS , Aurel DAMIAN

Faculty of Veterinary Medicine, UASVM Cluj-Napoca,
3-5 Mănăştur Street, 400372, Cluj-Napoca, Romania, tel: 0264 596384 int. 181.

Corresponding author, e-mail: pedre2@us.es, catedra1mv@yahoo.com

Abstract

The study has been carried out in order to assess the anatomic characteristics specific to the neurocranium in some wild species: wolf (Canis lupus), marten (Martes foine) and fox (Vulpes vulpes). The differentiation of the neurocranium is made very difficult in the mentioned species, for reason which it is important to know the morphological peculiarities of the skeleton of these wild carnivorous animals. For this study, we have used corpses of animals of different genders and ages, originated in woodlands and zoos from Transylvania. They have been processed through known anatomic techniques until bone parts have been obtained in the Laboratory of Comparative Anatomy within the Veterinary Medicine Faculty of Cluj-Napoca. The methods used during the dissection and the processing of the bone parts consisted of visual observation and macroscopic analysis of each and every bone. The sagittal crest and the mastoid process are well developed at the three species studied. Two side holes have been noticed on each side of the occipital condyle at wolf, while these do not exist at marten and fox. The zygomatic process of frontal bone is little developed at marten, the supraorbital hole does not exist in all the examined species, and the external protuberance of the occipital has been only noticed at fox and marten, as a distinct entity. The study has highlighted some characteristics of the bones which are part of the neurocranium, that will lead to exact assessment of the skull descent species in wolf, fox and marten.

Key words: *fox, neurocranium, marten, wolf,*

INTRODUCTION

People have always been fascinated by skulls and bones, that's why this study has been carried out in order to assess the anatomic characteristics specific to the neurocranium in some wild species, such as the wolf (*Canis lupus*), the marten (*Martes foine*) and the fox (*Vulpes vulpes*). The neurocranium is the most important part of the skull and its role is to protect the brain. It consists of the occipital bone, sphenoid bone, pterygoid bone, ethmoid bone, vomer bone, temporal bone, parietal bone and frontal bone. (Getty, 1975; Nickel *et al*., 1987; Dursun, 1994; Atalar and Yilmaz, 2004; Atalar and Temizer, 2009). The differentiation of the neurocranium is made very difficult in the mentioned species, for reason which it is important to know the morphological peculiarities of the skeleton of these wild carnivorous animals.

Reported to the existing speciality literature, we may say that during the last years a poor attention has been given to these aspects, in the above mentioned wild animal species.

In this paper, we proposed a systematic and detailed analysis of these aspects through classical anatomic methods.

MATERIALS AND METHODS

For this study we have used cadavers of animals of different genders and ages, originated from forestry areas and zoos from Transylvania, which have been processed through known anatomical techniques until we obtained bone

parts in the Laboratory of Compared Anatomy within the Faculty of Veterinary Medicine in Cluj-Napoca. The methods used during the dissection and the processing of the bone parts have consisted in visual observation and macroscopic analysis of each and every bone.
We have used the classical working methods, starting with the demarcation of the body, then the storage and the freezing at a temperature of about -18ºC. The skull has been subject to the thermal processing by boiling in the autoclave, in solutions of detergent and degreasing agents, at a low fire in order to avoid the destruction of the joints. The anatomic investigation has been followed by pictures taking.

RESULTS AND DISCUSSIONS

The wolf (*Canis lupus*) is the most spread species of the mammals who live at present. In old times, the wolf was present on the whole North hemisphere, adapting successfully to the most different living conditions. The Romanian wolf has been within the scope of attention of many worldwide researchers. It is a very talented hunter, but his living manner has a major impediment: it is the direct competitor of the human.

Fig. 1. Wolf skull (*Canis lupus);*

The fox (*Vulpes vulpes*), which is part of the same family as the wolf, is one of the most hunted, hated and not understood animals; it it spread in North America, from Alaska and Canada up to Mexico, in Europe, from Scandinavia up to Greece, on almost all Asian continent, including the Japanese islands.

Fig. 2. Fox skull (*Vulpes vulpes)*

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The marten (*Martes foina*) is a typical representative of the marten family (Mustelidae). They are spread on extended zones of Eurasia, their habitats being spread from the Central Europe, Western and Southern Europe up to the Central Asia, in the Mongolian regions and the Himalaya Mountains. As a sinantrop species, they may be often found near the human habitations, in villages or towns, where they hide in the wood piles, gravel piles or in stone walls, in barns, stables, summer houses and attics.

Fig. 3. Marten skull (*Martes foina);*

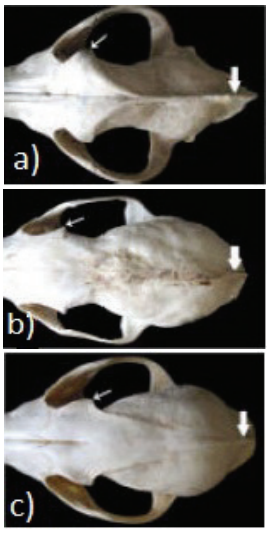

Fig. 4. Dorsal view of the cranium (a) wolf, (b) marten, (c) fox;

Figure 4, represent the wildlife skulls, dorsal view, for wolf, marten and fox. The frontal zygomatic process was angular in all species examined, less developed in the wolf and fox and developed in the marten. The supraorbital foramen was absent for the marten.

The supraorbital foramen is absent for all species.

Crista sagittalis externa was very well developed in the wolf, and for marten and fox is insignificant. The frontal bone at marten is narrow and flat, short in the fox, slightly concave to wolf. The dorsal sur face of the neurocranium consists of a paired parietal and frontal bones. The caudal aspect of the neurocranial portion of the skull is formed by the occipital bone. The temporal bone is the most prominent bone in this study, which forms the lateral part of the neurocranium. (Hidaka et.al, 1998). The findings obtained from wolf, fox and marten in the present study showed a similarity with the findings of the researchers given above

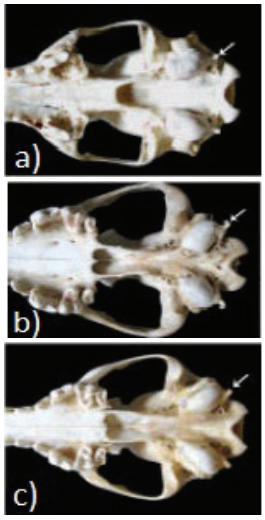

Fig. 5. Ventral view of the cranium (a) marten, (b) wolf, (c) fox;

In the Figure 5, the processus paracondylaris, in the wolf, marten and fox, was projected ventrally. The protuberantia occipitalis externa, was very distinct in wolf, while was indistinct in the marten and fox.

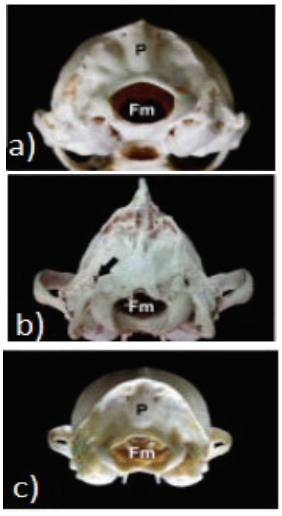

Fig.6. Caudal view of the cranium (a) marten, (b) wolf, (c) fox;

Figure 6, at the wolf, there was two foramen laterally, on the each side of the Condylus occipitalis. Foramen magnum (fm) is almost oval in all species examined in our present study. At the wolf and fox, the protuberanta occipitalis externa, is apparent even in this regard.

CONCLUSION

Distinguishable differences in bones forming the neurocraium were observed among the wild carnivores. In this study, we tried to document the similarities and differences of these bones in carnivores.

The frontal zygomatic process was angular in all species examined, less developed in the wolf and fox and developed in the marten.

The supraorbital foramen was absent for the marten.

Crista sagittalis externa was very well developed in the wolf, and for marten and fox is insignificant.

The temporal bone is the most prominent bone.

Paired of parietal bone joined each other at the midle, forminh the sutura sagittalis in the wolf and fox, while it was separated by the linea temporalis in the marten.

The mastoid process is present at both specoies, domestic carnivores and wild, as described in the present paper.

Foramen magnum was almost oval at this wild species.

Only, the wolf, are two foramen laterally on the each side of condylus occipitalis, and the marten and fox are absent.

Zygomatic arch is completely closed to all species described.

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