CONTRIBUTIONS TO THE STUDY ON DIFFERENT PARAMETERS OF THE CARPATHIAN LYNX (*Lynx lynx ssp. carpathicus*) SKULLS FROM ROMANIA

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Abstract

This species is not included on the I.U.C.N. Red List, but in Romania, due to the relative high number of individuals, it is considered to be a protected species by governmental acts. During certain periods, in exchange of a tax, hunting is accepted for a limited number of individuals. Five skulls of Eurasian lynx, owned by the Department of Anatomy Museum of the Faculty of Veterinary Medicine of Bucharest, were morphometrically examined. The dimensions of the five skulls were compared with the literature in order to fit into the subspecies called Carpathian lynx (Lynx lynx ssp. carpathicus). Cranial measurements were performed using electronic digital calipers reading a tenth of a millimeter. Cranial measurements were compared with those made by Angela von den Driesch (1976). Generally, it was observed that the results regarding the dimensions of the skulls can be compared with the results obtained by G.E. Predoiu (2011). But there are four parameters, maximum width of the skull between the orbits, the width of the canine teeth socket, maximum length of skull and length of the mandible, larger than the subspecies described by G.E. Predoiu. These dimensional differences can be explained by the fact that some of the 5 skulls from the Anatomy Department belonged to an outstanding specimen. The C.I.C. score (the value of trophy hunting that can be awarded) for 4 of the 5 studied cases show that the skulls belonged to an outstanding specimen with Gold Medal.

Key words: Carpathian lynx, cranial measurements, value trophy hunting

Introduction

Research undertaken in developing this paper are the justified concerns of many authors in discovering aspects of the cats skull morphology in zoos and national parks, but also in veterinary forensic medicine. Loss of habitat, reduced food sources and intensive hunting (there was a period in Romania, the '50s – '60s of last century, when it was considered a harmful species for herbivorous species that were being hunted – red deer, roe deer, chamois etc.) were causes that may explain the reduction of population in Romania of the Eurasian lynx subspecies known as Carpathian lynx (*Lynx lynx ssp. carpathicus*) in the Carpathian Mountains.

Due to this situation and given the Order of the Romanian Government 20/2014 and 31/2014 Emergency Ordinance of the Romanian Government, the Carpathian lynx is considered a species requiring strict protection in Romania.

Comparative skull morphology is a classical method to study the degree of similarity between species for taxonomic classification and differentiation.

Considering this situation and the fact that there is limited literature regarding the anatomical parlicularities of this species, we consider that a description of the skull of the Carpathian lynx, which is regarded as a valuable hunting trophy, would be useful.

This study contains comparative data between feline species, but only measurements and issues that may be identified at the species *Lynx lynx ssp. carpathicus* and comparisons of skull dimensions to other subspecies of lynx.

The literature is limited regarding the skulls identification based on their morphology, depending on the geographical area and size, mostly due to the erroneous identification of species in their home countries.

Most biologists are not yet familiar with the connection between morphology and feline zoo archeological and paleontological literature describing many distinctive features of skulls (Meriam & Stock – 1932, Schmid – 1940, Seymour - 1993). Comparative morphology of the skulls, teeth and morphometry characteristics of dentition can be found in the monography by German E.Schmid (1940) „Variationsstatisische Untersuschungen am Gebis pleistozaner und rezenter Leoparden und anderer Feliden".

In 1976, Angela von den Driesch designed and described standard measurements for skulls of different species, including cats. Later, in 1999, Seymour compares skull morphology of small feline from South America and adds applicable features that were investigated in this study. Cat skull morphology of medium and large genus Panther was partially described by Todd, 1966; Werdelin, 1983; Lamerichs, 1985; Seymour, 1989; Larsen 1997.

Materials and methods

The study was performed on five Carpathian lynx skulls (*Lynx lynx ssp. Carpathicus*) of the Department of Anatomy Museum at the Faculty of Veterinary Medicine in Bucharest, skulls that are present in the museum for over 40 years. One of the skulls is incomplete. It is not known the sex which the skulls belonged to, but according to literature, dimensional differences are not significant in the skulls of the two sexes. The area from which these samples were taken is also unknown.

The description of skulls, identification and homologation of formations were performed according to Nomina Anatomica Veterinaria (N.A.V.), 2005.

Measurements were performed on pieces of bone (skull and jaw). Physical measurements were made using livestock compass, ruler and caliper (classical and electronic).

Results and discussions

The five Eurasian lynx skulls were examined morphometrically. The dimensions of the five skulls were then compared with the literature in order to fit them into the subspecies. The cranial measurements included those used by Angela von den Driesch (1976). As a result of studies performed on a larger number of lynx skulls (*Lynx lynx*), G.E. Predoiu (2011) managed to create the taxonomic classification of the studied specimens, based on measurements of length. Data was taken to be compared with those obtained in this study. According to S. Larson (1997), the study of both basal condyle length and other morphological aspects, like the length of the canine teeth, length and aspect of the nasal profile, width of the skull, etc. it can contribute to a more accurate determination of the origin of all studied skulls. In order to compare the parameters of the five studied skulls the mean of each parameter was made. The mean of each parameter was compared to the mean of each parameter of the study conducted by G.E. Predoiu (2011) on other subspecies of the Eurasian lynx. The results obtained are presented below in tabular form and suggestive charts (Table 1).

It is noted that in general, the 5 studied skulls fit into the dimensions of the Carpathian lynx skull (*Lynx lynx ssp. Carpathicus*) studied by G.E. Predoiu (2011).

However, there are four parameters that are larger than the subspecies of lynx studied by G.E. Predoiu (2011), these parameters being: the maximum width of the skull between the

orbits (4.64 cm), width of the skull to the socket canine teeth (6.64 cm), the maximum length of skull (17.24 cm) and the total length of the mandible (10.66 cm).

Table 1.

Craniometry main measurement values - discipline Anatomy-FMV Bucharest, Romania (after G.E. Predoiu, 2011), Slovakia (after G.E. Predoiu, 2011), Russian Federation (after G.E. Predoiu, 2011)(in cm)

Nr.crt.	Skull measurements	Location of the measured skulls			
		media/ 5 skulls dep. Anatomy, FMV	Romania/51 skulls	Slovakia/ 81 skulls	Russian Federation/ 19 skulls
1	the width of the skull to the mastoid process	5.46	6.40	6.35	6.54
2	maximum width of the skull between the orbits – Entorbitale-Entorbitale	4.64	3.39	3.13	3.44
3	the width of the skull to the socket canine teeth	6.64	4.14	4.27	4.18
4	the maximum length of the skull – Akrokranion / external occipital protuberance – Prosthion	17.24	15.10	14.80	15.50
5	condylobazal length - from the edge of the occipital condyles at Prosthion/incisor labial slot	12.88	13.50	13.30	14.00
6	The total length of the jaw - the condyle to infradental / rostral edge of central incisors alveoli	10.66	10.00	9.80	10.50

These dimensional differences can be explained by the fact that perhaps some of the five skulls of the Anatomy Department belonged to outstanding examples of possible trophies with high score, score that will be calculated and presented in this subchapter.
The trophy hunting score (C.I.C. score) is calculated by adding two values, the skull width and skull length (Table 2).

Table 2.

Scoring C.I.C. and medals that could be awarded

Measurements	Lynx 1	Lynx 2	Lynx 3 – incomplete skull	Lynx 4	Lynx 5
The maximum length of the skull	13,0	19,6	17,6	18,7	17,3
skull width at the zygomatic arch	9,0	11,4	10,6	11,7	9,1
C.I.C. scoring	22	31	28,2	30,4	26,4
The medal that could be awarded	-	gold	gold	gold	gold

The C.I.C. scoring which 4 of the 5 skulls (between 26,4 and 31 points, respectively) of the Anatomy Department fall into shows that these skulls belonged to outstanding examples which can be classified as trophies that might be awarded the Gold Medal (over 26 points).

It is known that Prof. DHC Vasile Gheţie, who founded the Department of Anatomy Museum of the Faculty of Veterinary Medicine Bucharest, was an avid hunter and perhaps even those animals were hunted by the teacher and kept due to their beauty and size.

Conclusion

1. The five studied skulls fit in the dimensions of the Carpathian lynx (*Lynx lynx ssp. Carpathicus*), dimensions determined by G.E. Predoiu (2011).
2. Four parameters are larger than the subspecies of lynx studied by G.E. Predoiu (2011). These parameters are the maximum width of the skull between the orbits (4.64 cm), width of the skull to the socket canine teeth (6.64 cm), the maximum skull length (17.24 cm) and the total length of the mandible (10.66 cm).
3. These dimensional differences can be explained by the fact that perhaps some of those five skulls from the Anatomy department belonged to outstanding examples of possible trophies with high C.I.C scoring.
4. The C.I.C. scoring which 4 of the 5 skulls (between 26,4 and 31 points, respectively) of the Anatomy Department fall into shows that these skulls belonged to outstanding examples which can be classified as trophies that might be awarded the Gold Medal (over 26 points).

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