

Contributions to the biology of wolves (Mammalia: Carnivora) in Turkey

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Received: February 11, 2011

Accepted: February 19, 2011

Abstract

In this study, hair scale structure along with globulin and albumin proteins determined using SDS-PAGE, of *Canis lupus* from Iğdır province were examined. The structure of the hair scale was “flattened imbricate” and “irregular crenate coronal” at the base, shaft and tip. In both specimens, 6 bands were observed in the globulin region, 1 band in the postalbumin zone, 1 band in the albumin region and 4 bands in the prealbumin zone. No individual variation is found in the blood serum proteins examined.

Key words: *Canis lupus*, hair scale, biology, SDS-PAGE, distribution, Turkey

INTRODUCTION

In Turkey, 19 carnivora species have been recorded [1]. One of them, *Canis lupus* Linnaeus, 1758 (Wolf or Gray Wolf) also exists in the hilly, mountainous areas of North and South America, Europe to Asia including the Arabian Peninsula and Japan. Nevertheless, due to the human persecution this species is extirpated from most of USA, Europe (France, northern Italy, Sweden, Norway, Finland, Germany and Switzerland), Southeastern China and Indochina and the distribution and densities of wolves in Europe vary from country to country [2, 3].

In this paper some biological features of *Canis lupus* from a new locality in Turkey, are presented.

MATERIALS AND METHODS

This study was based on two live juvenile specimens and a young specimen, shot by hunters, from Iğdır (39° 55' N 44° 02' E) province (Fig. 1).

The guard hair of the specimens was taken from the shoulder blades dorsally and prepared according to Hayat [4]. The tip, middle, and basal parts of the hairs were photographed at 110X and 1600X magnifications with a JSM 5600 Scanning Electron Microscope (SEM). The determination of hair scale forms was defined according to Benedict [5].

After being anesthetized, blood samples were collected from femoral veins of the live specimens. In the laboratory, the sera were boiled for 3-3.5 minutes and preserved at -80°C until electrophoresis. SDS-PAGE was performed according to the method of Laemmli [6]. Separating (7.5 %) and stacking (4 %) gels were prepared according to the method of Sambrook et al. [7]. SIGMA Protein Molecular Weight Marker (MW-431) consisted of lysozyme (14.400), β -lactoglobulin (18.400), REase Bsp 981 (25.000), lactate dehydrogenase (35.000), ovalbumin (45.000), bovin serum albumin (66.000) and

β -galactosidase (116.000) was applied. The gel was run about 4.5 hours and then stained with 0.25 % Coomassie Brilliant Blue R-250 over the night. After destaining in a mixed washing solution of 45 ml methanol: 10 ml acetic acid: 45 ml dH₂O, gel was photographed. Blood serum proteins were evaluated as globulin and albumin regions. The albumin region is subdivided into prealbumin, albumin and postalbumin zones.



Figure 1. Juvenile (A) and young (B) wolf specimens examined in this study



Figure 2. Habitat of wolves in autumn (A) and winter (B) in Iğdır province

External and cranial measurements (mm) and weight (mm) was taken from the young specimen according to Harrison and Bates [8]. Although it was a male specimen, baculum of the specimen was not examined because of being damaged.

(A) Both juveniles were fed and released to their natural habitat by the authorities in Directorate of Nature Protection and National Parks of Iğdır.

The skin and skull of the young specimen were deposited in the Biology Department of Kirikkale University.

RESULTS

All the specimens were found in an abandoned open steppe area near a human settlement of a village. The village is located near a fountain (Fig. 2).

This is the first record of *Canis lupus* from Iğdır province in Eastern Anatolia (Fig. 3).

Hair Scale Structure

General coloration of the guard hair is composed of three colours; black, rufous brown and creamy white (Fig. 4).

The structure of the hair scale was flattened imbricate and irregular crenate coronal at the base, shaft and the tip (Fig. 5).

Blood Serum Proteins

In both specimens, 6 weakly stained bands were observed in the globulin region, 1 weakly stained band in the postalbumin zone, 1 strong stained band in the albumin region and 4 bands in the prealbumin zone. One of these bands in the line of the marker proteins between 18400 and 14400 D was fast and weakly stained. Nevertheless, the second and the third bands were stained strongly. In addition, the fourth one in the line of the marker protein of 45000 D was slow and the weakly stained (Fig. 6).

Measurements

The measurements of the young specimen; Total length: 1060 mm, Tail length: 250 mm, Hindfoot length: 180 mm, Ear length: 180 mm, Greatest length of skull: 168.2 mm, Condylbasal length: 159.5 mm, Zygomatic breadth: 93.6 mm, Braincase breadth: 54.1 mm, Interorbital constriction: 28.4 mm, Maxillary tooththrow length: 82.2 mm, Mandibular tooththrow length: 79.9 mm, Mandible length: 122.5 mm, Weight: 1000 g.

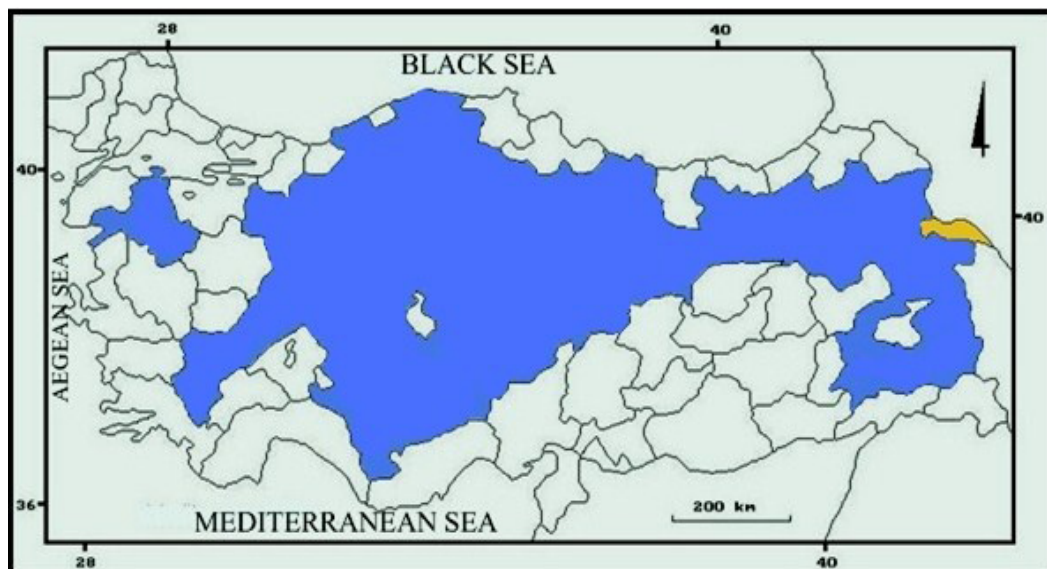


Figure 3. Distribution map of *Canis lupus* from Turkey. Previous records (●) and new record (●)

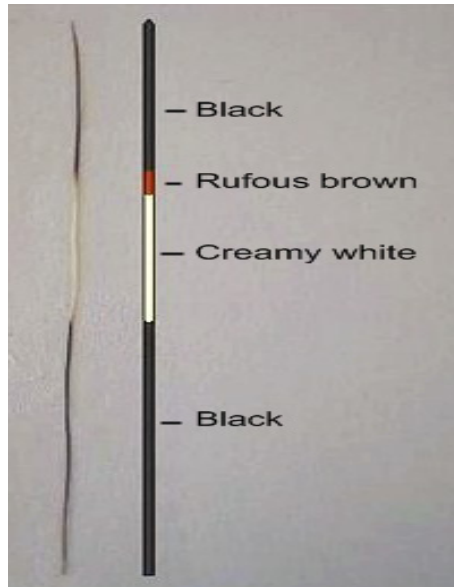


Figure 4. The coloration of the guard hair of *Canis lupus* from Eastern Anatolia

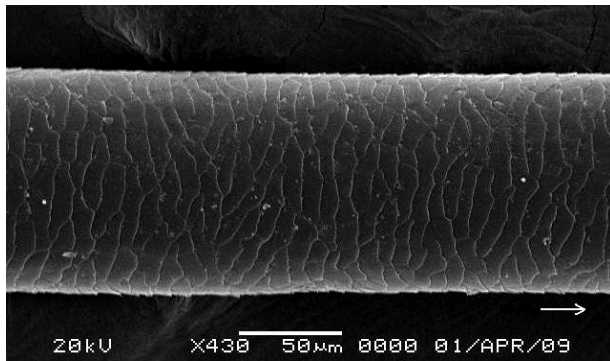


Figure 5. Hair scale structure of the shaft of *Canis lupus* (The arrow shows the orientation toward the tip of the hair)

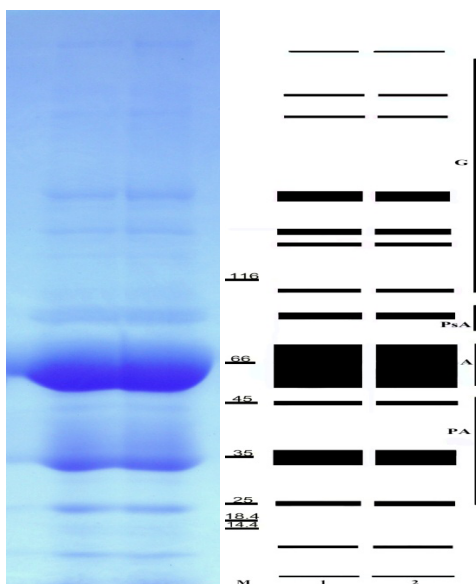


Figure 6. Blood serum proteins of *Canis lupus* (G: Globulin, PsA: Postalbumin, A: Albumin, PA: Prealbumin) Numbers in the left column indicate the molecular weight of the proteins.

DISCUSSION

So far, less studies about wolves from Turkey have been published [3, 9-11]. Salvatori and Linnell [3] reported wolves' records from some provinces in Turkey without given any map. However, with this present study, we recorded *Canis lupus* from Iğdır province for the first time.

Consequently, being a predator wolves attack to the villages and are killed or hunted because of livestock depredation all the year-long by local people [10]. Wolves had not been legally protected in Turkey until 2003 [3]. Nevertheless, the wolves are now protected by laws of Directorate of Nature Protection and National Parks of Turkish Ministry of Environment. Although its population has been in decline since 1980s, northern, central and eastern parts of Turkey still possesses the largest wolf population in Europe. The species has disappeared in the western, northwestern and southern parts of Turkey [3]. However, recently Yiğit et al. [11] have recorded *Canis lupus* based on the droppings of the animal from Kazdağı National Park in Balıkesir.

Albayrak and Çoban [12] examined the hair scale pattern of wolf and determined that the morphology of the hair was "wavy crenated" type. Although the figure of the hair presented in their study was very similar to the one examined in this study, the dissimilarities between the data could be due to the differences in author interpretations.

No variation is found in the blood serum proteins of both specimens from Eastern Anatolia. Specimens from other populations in Turkey, should be examined further in detail for comparison the protein bands among each population.

Furthermore, to determine the taxonomy, ecology, biology and population status of the gray wolves entirely in Turkey, more studies from the Aegean, Mediterranean regions and the Turkish Thrace are also needed.

Acknowledgement

We thank Directorate of Nature Protection and National Parks of Iğdır province for their help in this study.

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