

On the Food of the Imperial Eagle *Aquila heliaca* on Sakar Mountain and Dervent Heights, Bulgaria

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ABSTRACT

The food of the Imperial Eagle on Sakar Mountain and Dervent Heights in Bulgaria is investigated. The information and material were gathered during the period 1998-2003. Twelve food components of the species' diet are reported for the first time in Bulgaria.

INTRODUCTION

In the food of the Imperial Eagle *Aquila heliaca* in Bulgaria, 14 species of mammals, 18 species of birds, 1 species of reptile and various insects are recorded.

The composition of the diet of the Imperial Eagle in Bulgaria was previously studied only in the region of Sredna Gora Mountain (near Koprivshtitsa) and only one pair was investigated, the main prey there being *Spermophilus citellus* and *Microtus arvalis* (Simeonov & Petrov 1980). Our aim was to gather more comprehensive information about its diet from the regions of Sakar Mountain and Dervent Heights (South-East Bulgaria) where the largest Bulgarian population of the species breeds.

STUDY AREA

Sakar Mountain and Dervent Heights are situated in the south-eastern part of Bulgaria near the Turkish border.

The landscape and climate are similar in both areas, characterized by large open grasslands and cultivated areas with small patches of forest. The study area ranges from 100 to 650m above sea level. There are rounded hills and open valleys with small rivers. There is a strong Mediterranean climate influence in the region that allows for unique ecosystems of specific fauna and flora.

MATERIAL AND METHODS

Investigation into the Imperial Eagle's diet on Sakar Mountain was begun in 1993 by Green Balkans members sporadically collecting samples whenever it was possible. Systematic work started within the Ministry of Environment and Waters (MoEW) financed project. "Mapping of the breeding sites of the Imperial eagle and measures for their conservation" from 1997-1999, during which Green Balkans covered the region of Sakar Mountain and Derwent Heights. The contents of pellets, bone, and skin remains gathered there during the period 1997-2002 were analyzed.

The material was collected after the breeding period, from below and within the nests themselves as well as from the feeding places of four pairs (3 in Sakar Mountain and 1 in Derwent Heights).

There were 173 different bone remains from 154 specimens collected. The species were determined using keys by Day (1966), Macdonald and Barret (1993), Minkov (1970) and Peshev *et al.* (1970).

The birds and some mammal species were determined with the co-operation of Nikolai Spassov (National Museum of Natural History, Bulgarian Academy of Science) and Evgeni Raichev (Trakya University- Stara Zagora).

RESULTS AND DISCUSSION

The results of the study are to be found in Table 1. We suppose that the mammals: *Canis familiaris*, *Sus scrofa domestica*, *Ovis aries*, *Capreolus capreolus*, *Bovidae sp.* and *Canidae sp.* were eaten by the eagles as carrion.

Sakar Mountain - Food

The main mammalian prey in Sakar Mountain was *Erinaceus concolor* (32.50 % of occurrence). *Lepus europaeus* (10.00 %) and juvenile *Vulpes vulpes* (3.33 %) are taken relatively often. The percentage of *Spermophilus citellus*, which is the main food source in Sredna Gora Mountain (Simenov & Petrov 1980), is very low (1.67 %). Only one specimen of *Mustelidae* was registered (0.83 %). 20.00 % of the material analysed was from large animals and we accordingly conclude that carrion forms a major component of the eagle's diet. One of the prime reasons for this is the artificial feeding of pair No.2 with carcasses mainly of *Equus caballus*, *Capra hircus*, *Ovis aries*, with small amounts of *Oryctolagus cuniculus domesticus* and *Sus scrofa domestica*.

Among the bird species, the highest percentage recorded was *Gallus gallus domestica*, 10.83 % - the second highest level of occurrence overall after *Erinaceus concolor*. The percentage of occurrence of *Larus cachinans* was relatively high, especially in the food of pair No. 2 (9.78 %), whose territory included the rubbish tip of Svilengrad. Only single specimens were recorded of *Burhinus oedicnemus*, *Carduelis chloris*, *Corvus corone*, *Corvus frugilegus*, *Falco tinnunculus*, *Cairina moschata domestica*, *Ciconia ciconia*.

The main reptile prey was *Ophisaurus apodus* (4.17%) and only single specimens were found of *Testudo graeca*, *Testudo sp.*, *Serpentes sp.*, and one unidentified species of reptile.

Sakar Mountain - Feeding behaviour

Bone remains from *Carduelis chloris* lead us to suppose that it was robbed

from a smaller raptor. This behaviour is often observed in wintering birds in the Indian region (Ferguson-Lees & Christie 2001).

According to Petrov & Stoychev (2002), *Aquila heliaca* eat White Storks when found dead, while Ivan Ivanov observed two eagles successfully attack and kill one from a migrating flock passing over their nest.

Krasimir Gelev ("Green Balkans") observed an Imperial Eagle on Sakar Mountain drop hedgehogs (*Erinaceus concolor*) from the air to kill them. Mladen Georgiev ("Green Balkans") observed a pair catching *Passer hispaniolensis* from their nests situated in the bottom of the eagles' nest.

Hunting for insects on foot was observed for another pair. This behaviour is also typical for the species (Ferguson-Lees & Christie 2001).

In Dervent Heights hunting for voles on foot was observed in the spring of 2003.

Dervent Heights - Food

The most frequently found mammal was *Lepus europaeus* (25.00 %), and possibly this is the main food source in Dervent Heights. After this came *Spermophilus citellus* (10.42 %) and *Nannospalax leucodon* (4.17 %). Bones from a single specimen of *Capreolus capreolus* were recorded.

Of birds the highest percentage of occurrence was *Gallus gallus domestica* (20.83 %), second overall after *Lepus europaeus*. *Perdix perdix* and *Ciconia ciconia* occurred in equal quantities (10.42 %) followed by *Corvus corone* (4.17 %).

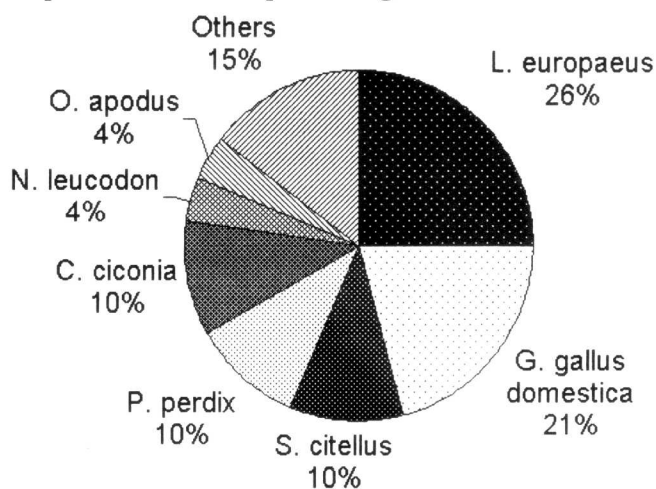
Only two reptile specimens (*Ophisaurus apodus*) were registered.

CONCLUSIONS

On Sakar Mountain, 14 species of mammals, 9 species of birds and 5 species of reptiles were registered. On Dervent Heights, 5 species of mammals, 4 species of birds and 1 species of reptile. On Sakar Mountain and Dervent Heights combined, 15 species of mammals, 10 of birds and 5 of reptiles were registered (see Table 1).

The Imperial Eagle from Sakar Mountain and Dervent Heights has a varied diet and not one of the food components exceeded 50 % of occurrence. The main prey on Sakar Mountain was *Erinaceus concolor* (32.50 %) and *Gallus gallus domestica* (10.83 %), but the main food source was from dead carcasses. The main prey and food source in Dervent Heights was *Lepus europaeus* (25.00 %) and *Gallus gallus domestica* (20.83 %). *Capreolus capreolus*, *Canis familiaris*, *Capra hircus*, *Equus caballus*, *Oryctolagus cuniculus domesticus*, *Larus cachinans*, *Burhinus oedicephalus*, *Carduelis chloris*, *Falco tinnunculus*, *Cairina moschata domestica*, *Ophisaurus apodus* and *Testudo graeca* are reported for the first time in the diet of the Imperial Eagle in Bulgaria.

Figure. 1 Composition of the Imperial Eagle diet on Sakar Mountain.



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