

**First fossil record of the Snowy Owl
Nyctea scandiaca (Linnaeus, 1758)
(Aves: Strigidae) from Bulgaria**

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**Historical and ecobiogeographical characterization
of *Nyctea scandiaca***

The Snowy Owl is a resident species, spread in the Arctic zone. Sometimes it makes irregular dispersal movements to the south. It inhabits the hilly tundra and rocky coasts. It nests on the ground. Separate individuals may reach the Temperate zone during their nomadic migrations (HARRISON, 1982). Usually it is spread between 0 and 1100-1500 m a.s.l. (in Norway). The range and density of populations depends on the abundance of lemmings (*Lemmus*, *Dicrostonyx*). In good years it enlarges its breeding range to the south, where the species avoids forest and broken areas. The Snowy Owl is in regress in the 20th century. It has been recorded in former Czechoslovakia, Hungary and the Balkans as a rare winter visitor (CRAMP, 1989).

Distribution of *Nyctea scandiaca* in the Quaternary

The presence of the species in the Pleistocene sites throughout Europe is an indication for colder local climate (MOURER-CHAUVIRÉ, 1976). Nevertheless it was a common species in Europe during the Pleistocene, in spite of the fact that relict populations have survived nowhere up to the Holocene.

BRODKORB (1971) summarized the numerous data on the Pleistocene and Holocene distribution of the species in England, Spain, France, Sardinia, Italy, Germany, Switzerland, Denmark, former Czechoslovakia, Poland, Austria, Hungary, Azerbaijan, Alaska, and Illinois.

We found a series of new records on the Quaternary distribution of the Snowy Owl in other sources, chiefly published in the last 1-2 decades:

Late Pleistocene: The Velika Pecina Cave and the Vindija Cave in Croatia (MALEZ-BACIC, 1975); Aurignacian in the Istallosko Cave (JANOSSY, 1954); the La Vash Cave (KOPY, 1957); Late Palaeolithic in Cauna de Belvis and Canecaude I (VILETTE, 1986), Magdalenian (14 380 - 12 980 B.P.) in Pierre-Chatel (DEBROSSE & MOURER-CHAUVIRÉ, 1973), Magdalenian (13 060 - 13 370 B.P.) in Cantet (Espeche) in the Pyrenees (CLOT et al., 1984), Magdalenian in Morin (CHAUVIRÉ, 1965), Riss - Wurm, Wurm 3-4 and Azil in the Pyrenees (CLOT & MOURER-CHAUVIRÉ, 1986), Magdalenian in the Grotte du Rond-du-Barby (MOURER-CHAUVIRÉ, 1974), Late Paleolithic in Le Piage (Lot) (MOURER-CHAUVIRÉ, 1981), final of Late Pleistocene in the caves La Colombiere, Pierre Chatel, Abry Gay, Saint-Romans, Gabillou, Pierr-Chatel, Gare de Couze, Duruthy, Montmorillon, Fontales, Fontarnaud, Roc de Marcamps, Faustin, Rochereil, Le Morin (MOURER-CHAUVIRÉ, 1977); in Le Morin (*N. s. gallica*) (MOURER-CHAUVIRÉ, 1975) in France; Brillenhöhle (BOESSNECK & von den DRIESCH, 1973) in Germany; Kent's Hole in England (HARRISON, 1980); Wurm 3 (28 000 B.P.) to Postglacial (ca. 4000 B.P.) in a number of localities in S France and Catalonia in Spain (VILETTE, 1983); „pre-Wurm“ in the „K. Lambrecht“ Cave, Late Wurm in Pilisszanto - 1 and Remetehegy in Hungary (JANOSSY, 1986); Ingarano in Italy (BARBATO et al., 1992); Late Wurm 3 (20 000 B.P.) - Middle of Wurm 4 (12 500 B.P.) in Arene Candide in S Italy (CASSOLI, 1980); Wurm (Aurignacian) in the Grotte de Fumane in N Italy (BARTOLOMEI et al., 1992); Grotta di Madonna (CASSOLI, 1992) and Palaeolithic in the Chokourcha Cave and the Prolom 2 Cave in Crimea (BARYSHNIKOV & POTAPOVA, 1992).

Middle Pleistocene: 150 000 - 125 000 B.P. in the Lazaret Cave (VILETTE, 1993) and L'Escale, Aven 1 and Orgnac 3, Le Lazaret, Rizerolles a Azé (MOURER-CHAUVIRÉ, 1975) in France; Hunas (Hartmannshof) in Germany (JANOSSY, 1983) and Palaeolithic (Mousterian) in the Gorham's Cave in Gibraltar (EASTHAM, 1968).

The Bulgarian find of *Nyctea scandiaca*

There have been no published data on the presence of the Snowy Owl, both in the fossil and the recent avifauna of Bulgaria up till now. SIMEONOV et al. (1990) included the species as a probable accidental winter visitor of the country.

The find originates from a depth of 400-405 cm from the Kozarnika Cave near Oreshets, about 5 km NW of Belogradchik (NW Bulgaria). UTM code: FP 43 (Fig. 1). The cave is situated at about 1000 m a.s.l. The regular archaeological excavations have been carried out since 1994 under the direction of Dr Nikolay Sirakov (Archaeological Institute and Museum, Sofia). The soundings at a depth of 3,30 m revealed 12 stratigraphical units (SIRAKOV et al., in press). Associated fauna: *U. spelaeus* (NIKOLOV, 1983); *Ursus arctos*, *Bos* sp., *Homo* sp., Ovicaprinae indet. (pers. data); *Talpa europaea*, *Sorex araneus*, *S. minutus*, *Crocidura suaveolens*, *Neomys* sp., *Lepus* sp., *Ochotona pusilla*, *Allactaga jaculus*, *Mesocricetus new-*



Fig. 1. Recent breeding range of *Nyctea scandiaca* in Western Palearctic (according to CRAMP, 1989); 1 - location of the site, Kozarnika Cave

toni, *Cricetulus migratorius*, *Spermophilus citellus*, *Nannospalax leucodon*, *Lagurus lagurus*, *Clethrionomys glareolus*, *Microtus arvalis*, *Microtus ? agrestis*, *Pytimys subterraneus*, *Chionomys nivalis*, *Microtus oeconomus*, *Arvicola terrestris*, *Sicista subtilis*, *Apodemus microps*, *Apodemus* ex. gr. *sylvaticus*, Pisces, Lacertidae, Chiroptera (Margarita Marinska - pers. comm.); *Rangifer tarandus* (V. Popov - pers. comm.). The archaeological and palaeofaunistic materials have dated back the layers between 80 000 and 16 000 B.P., i.e. Late Wurm (Dr N. Sirakov, Dr Vassil Popov /Institute of Zoology, Sofia/ - pers. comm.). Most of the finds originated in the initial Late Palaeolithic (the transition from Interpliglacial 2 to Pleniglacial 2) (SIRAKOV et al., in press).

The find (No. NMNHS 8480/1997) represents an intact phalanx 3 digitorum IV pedis dextra of an adult specimen (sample No 73 H/7, collected in 1996 by Dr N. Sirakov; Fig. 2). The measurements (Fig. 3) of the bone are given on Table 1.

Discussion

The general shape of the bone and its articular surfaces suggest a Strigiform bird. All small to medium sized Western Palearctic owls (*Glaucidium passerinum*, *Otus scops*, *Aegolius funereus*, *Athene noctua*, *Asio otus*, *A. flammeus*, *Surnia ulula*, *Tyto alba*, and *Strix aluco*) are excluded due the dimensional and propor-



1 cm



1 cm



1 cm

Fig. 2. The find of *Nyctea scandiaca* from the Kozarnika Cave (No NMNHS 8480/1997): a - lateral view; b - dorsal view; c - ventral view (Photograph: Boris Andreev)

Table 1

Measurements of the phalanx 3 dig. IV pedis of recent and fossil *Nyctea scandiaca**

Species	a	b	c	d	e	f	g
Fossil							
<i>Nyctea scandiaca</i> - NMNHS 8480	5.0	3.4	6.6	4.0	5.4	5.5	18.7
Recent							
<i>Nyctea scandiaca</i> - NMNHS 1/ 1992	4.8	3.1	6.2	3.9	4.7	5.1	17.6
<i>Nyctea scandiaca</i> - NMNHS 2/ 1993	4.8	3.2	6.4	3.9	4.6	5.2	18.2
<i>Bubo bubo</i> - NMNHS 1/ 1982							25.5
<i>Bubo bubo</i> - NMNHS 7/ 1989	5.6	3.2	7.4	4.7	5.9	6.5	23.1
<i>Bubo bubo</i> - NMNHS 12/ 1993	6.0	3.5	7.4	5.1	6.4	6.8	22.3
<i>Bubo bubo</i> - NMNHS 13/ 1993	6.0	3.6	8.0	5.0	7.2	7.0	24.3
<i>Bubo bubo</i> - NMNHS 14/ 1993	6.0	3.5	8.0	5.6	7.0	7.2	26.0
<i>Strix uralensis</i> - NMNHS 1549	-	-	-	-	-	-	ca. 15.0
<i>Strix uralensis</i> - NMNHS 1550	-	-	-	-	-	-	ca. 12.0
<i>Strix aluco</i> - NMNHS 9/ 1993	3.4	2.1	4.2	3.3	2.8	4.2	15.8

* The manner of measurements is shown on Fig. 3.

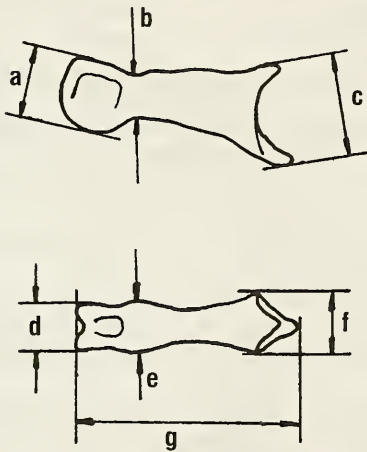


Fig. 3. The manner of measurements of the phalanx (Drawing: Vera Hristova)

Table 2
Tarsus length of some large Palearctic strigid species (after CRAMP, 1989)

Species	Tarsus (mm)	
	males (x)	females (x)
<i>Nyctea scandiaca</i>	52.3	56.6
<i>Bubo bubo</i>	79.3	82.2
<i>Strix uralensis</i>	51.4	53.9
<i>Strix nebulosa</i>	53.9	55.1



Fig. 4. Ventral view of the proximal end of phalanx 3 digitorum pedis IV dextra: the specimen No 8480 (left) and recent *Bubo bubo* (right)

tional (total length : width in the middle) differences.

Four species of larger size are represented in the West-Palearctic avifauna: *Bubo bubo*, *Nyctea scandiaca*, *Strix uralensis* and *Strix nebulosa*. All skeletal elements of the Eagle owls are considerably larger (Tables 1, 2), while all measurements of *S. nebulosa* are 10 % larger at least as compared to those of *S. uralensis* (CRAMP, 1989). Another consideration: besides its dimensional proximity, dif-

fering it from the Snowy Owl, *S. nebulosa* is a resident species at present, spread in the Boreal zone. The present day dispersive irruption, specific for *N. scandiaca* are unknown for the Great Grey Owl. There are no Pleistocene records of *S. nebulosa* in the southern parts of Europe. The only fossil record of that owl has been reported for the Curata Cave in the Carpathian Chain in NE Romania (BRODKORB, 1971). In the whole West Palearctic the species is strictly confined to the thick conifer forest (HARRISON, 1982).

In comparison to the recent *N. scandiaca*, specimen No 8480 has a larger maximum width (measurement „e“) and wider articular face (measurement „f“). The articular face in caudal view is typical for the Snowy owl and its medial edge is slightly protruded. In comparison to the recent *Bubo bubo* the find from Kozarnika Cave is of a smaller size and has a sharper ventral edge of the proximal articular face (Fig. 4). In comparison to *Strix aluco*, the find is more robust in its distal half, where it is strongly protuberant (measurement „e“). The general shape of the phalanx in *S. aluco* is thin and cylindrical. All dimensions of the analogous phalanges of both species, *Strix aluco* and *S. uralensis*, are smaller (Table 1).

Acknowledgements

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**Първа фосилна находка на полярната сова
Nyctea scandiaca (Linnaeus, 1758) (Aves: Strigidae)
в България**

Златозар БОЕВ

(Резюме)

Досега полярната сова не бе известна както за рецентната, така и за фосилната орнитофауна на България. Събраната при археологически разкопки през 1996 г. в пещерата Козарника (Белоградчишко) от сондаж с дълбочина 400-405 cm цяла III фаланга от 4 пръст на десния крак на възрастен екземпляр (No NMNHS 8480) е първото доказателство за разпространението на вида на днешната територия на страната през късния плейстоцен (късен вюрм, преди 80 000 -16 000 г.). Представен е пълен преглед на кватернерните находки на полярната сова в света. Находката индикира по-южното през плейстоцена разпространение на този елемент от бореалната авифауна на Балканите.