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### Biogeographia - The Journal of Integrative Biogeography

#### Title

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#### Permalink

<https://escholarship.org/uc/item/6jw2q327>

#### Journal

Biogeographia - The Journal of Integrative Biogeography, 19(1)

#### ISSN

1594-7629

#### Author

Boev, Zlatorar

#### Publication Date

1998

#### DOI

10.21426/B6110114

Peer reviewed

# A range fluctuation of Alpine swift (*Apus melba* [L., 1758]) (Apodidae-Aves) in Northern Balkan Peninsula in the Riss-Würm interglacial

ZLATOZAR BOEV

*National Museum of Natural History, Bulgarian Academy of Sciences  
1 blvd. Tsar Osvoboditel, 1000 Sofia - Bulgaria*

Key words: Pleistocene avifaunas, Fossil birds, Palaeoenvironment, Balkan peninsula, Bulgaria.

## SUMMARY

Neornithologists consider the presence of Alpine swift in Europe as a postglacial phenomenon. Some paleornithologists believe that no suitable habitats remained in Europe for that species during the Pleistocene. Nevertheless, the Pleistocene record of *A. melba* from S. Spain, Catalonia, Mallorca, Gibraltar, Hungary, Italy (incl. Sardinia), and Crete, indicates its relatively limited distribution in the southernmost parts of the continent.

The Alpine swift at present is a migratory bird whose breeding range is limited by the 21.1 °C isotherm. In Balkans and Europe the species extends his range northward during the last several decades. The numerous finds from the Cave No 16 (part of the Temnata Cave system, N Bulgaria) dated 40,000-18,000 B.P. indicates its presence and relatively dense population in the Riss-Würm interglacial in the Northern Balkan Peninsula. At that time, the Swift (*Apus apus*) was about 13 times rarer in the paleornithocoenosis. Contrary, *A. apus* is the commonest swift on the Balkans in recent times.

## INTRODUCTION

Cave No 16, part of the Temnata Cave system 2.5 km NE of Karloukovo village (43,09 N, 24,04 E; 200 m a.s.l.), NC Bulgaria, provides very rich paleontological material of vertebrates, dated 40,000-18,000 B.P.

According to the data on Micromammalia, most assemblages of Cave No 16 show considerable similarity with the assemblages of the main cave – Temnata (Popov, 1994). Because of the much richer avifauna, the same can not be stated for the birds (see below).

## MATERIAL AND METHODS

The excavations were carried out since 1984 to 1993 by the Archaeological Institute (Bulgarian Academy of Sciences, Sofia), Institute of Archaeology (Jagellonian University, Krakow) and Institut du Quaternaire (Université Bordeaux I, Talence).

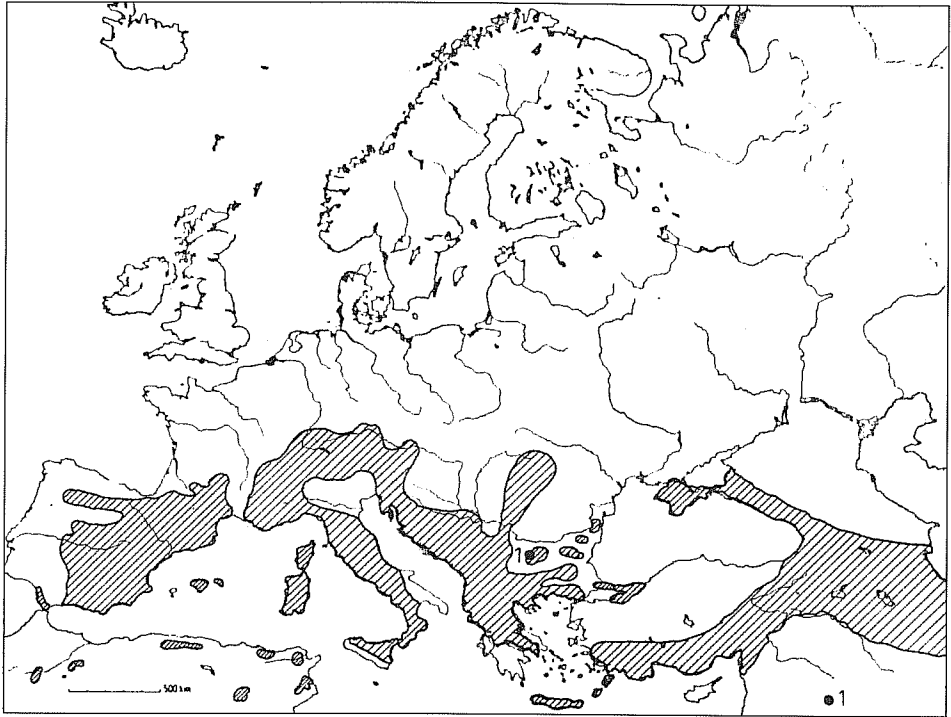


Fig. 1 - Recent breeding range of *Apus melba* (after Cramp, 1989). 1. Location of the Cave No 16 (Drawing: Lyublyana Gramenova).

The paleontological material for present study contains a total of 301 bone and bone fragments (No NMNH-Sofia F: 467; 746-1045) of 40 taxa. Eighty-one finds of *Apus melba* (No: 746-776; 778; 853; 872; 877; 883; 891-895; 906-907; 916-923; 926-930; 934-936; 939-940; 1001-1020) and six of *Apus apus* (No: 629; 665; 782-783; 924; 932) were collected.

All fossils were identified through the comparative avian osteological collection of the Zoological Department of the National Museum of Natural History, Bulgarian Academy of Sciences.

#### THE AVIFAUNA OF CAVE NO 16 AND TEMNATA CAVE

A total of 40 taxa were identified among the fossil finds collected in Cave No 16: *Accipiter nusus*, *Accipiter* sp., *Falco vespertinus*, *Falco* sp., Falconiformes fam., *Phasianus colchicus*, *Perdix perdix*, *Perdix/Alectoris*, *Coturnix coturnix*, *Crex crex*, *Rallus aquaticus*, *Gallinula chloropus*, *Porzana parva/pussila*, *Columba livia*, *Columba livia/oenas*, *Otus scops*, *Strix aluco*, *Apus apus*, *A. melba*, Alaudidae gen., *Anthus trivialis*, *A. arvensis*, *Lanius collurio*, *Sitta europaea*, *Turdus merula*, *T. pilaris*, *T. torquatus*, *T. philomelus*, *Turdus* sp., *Loxia curvirostra*, *Fringilla coelebs*,

*Pyrrhula pyrrhula*, *Passer montanus*, *Passer* sp., *Garrulus glandarius*, *Pica pica*, *Pyrrhocorax graculus*, *Corvus monedula*, Corvidae gen., Passeres fam.

The established avifauna of the main cave, Temnata, also consisted of 40 taxa, 22 of them unrecorded in the Cave No 16 up to now (Boev, 1994): Anatidae indet., *Aegypius monachus*, *Aquila pomarina*, *A. chrysaetos*, *Buteo* sp., *Cicus cyaneus*, *Falco tinnunculus*, *F.* cf. *subbuteo*, *Alectoris graeca*, *Tetrao* sp., *Streptopelia* aff. *turtur*, *Columba oenas*, *Bubo bubo*, *Asio otus*, cf. *Aegolius*, *Dendrocopus minor*, *Lullula arborea*, *Riparia riparia*, *Oenanthe oenanthe*, *T. viscivorus*, *Sturnus vulgaris* and *Nucifraga caryocatactes*.

#### THE FINDS OF SWIFTS

The recent Apodid avifauna of Bulgaria includes 3 species: the Common (Black) Swift *Apus apus* (L., 1758), Alpine Swift *A. melba* (L., 1758) and Pallid Swift *A. pallidus* (Shelley, 1870). The last species has very restricted sporadic distribution in the southernmost parts of the country (Simeonov, Mitchev, 1991). The only fossil find of swifts in Bulgaria comes from Temnata Cave – an ulna sin. of *Apus apus* (ca. 13,600 B.P.; Boev, 1994).

The remains of swifts in the Cave No 16 are numerous. They consist of about one third (28.9 per cent) of all bone finds of birds collected in this site. On the other hand, the finds of *A. melba* are 13.5 times more frequent than these of *A. apus*. The representation of both species is 81:6.

#### PRESENT AND PAST DISTRIBUTION OF *APUS MELBA*

*Apus melba* is a migratory species at present and it breeds in Western Palearctic in the southern regions of Temperate zone. The European populations winter in the Tropical zones, chiefly in Africa. The Alpine swift nests on the rocks in the arid mountain rocky massifs, cliffs and rocky coasts, as well as higher mountain parts (Harrison, 1982). The mean 21,1-July isotherm determines his distribution (Fig. 1) northwards and in the mountains (Eastham, 1988). However, there are observations, indicating that *A. melba* hunts insects up to 100 km away from his nest during the breeding season (Yetman, 1971).

Thus, characterized as a heat-loving avian species, Moreau (1954) considers that no suitable refuges for the Alpine swift remained during the Pleistocene glaciations in Europe, and its range was restricted south to Africa. Recent winter range of the species lies in East and South Africa and the Hindustan peninsula (Cramp, 1989).

Most data indicate that in recent times *A. melba* extends his range to W-NW. Such tendency is more clearly traced in the 20th century. It appeared in Scotland in 1892 and Wales in 1908 (Witherby, 1952), in Provence (France) in the first years of the century, in Savoie (France) – between 1936 and 1952 (Yetman, 1971),

in West Germany – in 1955 (Cramp, 1989); in Romania – in 1965 (Drugescu, 1987), in Switzerland (Lausanne) – in 1967 (Yetman, 1971). This author states that the anthropogenic changes of environment stimulate the range extension of *A. melba*. Being a highly adapted petrophylous form, in present century the Alpine swift invades the anthropogenic urban landscapes and become a synanthropic and synurbanistic species (Yetman, 1971; Dontchev and Iankov, 1989).

The Pleistocene record of *A. melba* includes Gibraltar, Sardinia, continental Italy and Hungary (the northernmost site) (Brodkorb, 1967). Additionally we have found data on Pleistocene finds of Alpine swifts from Mallorca (McMinn and Alcover, 1992); Southern France (150,000-125,000 B.P.; Vilette, 1993) and Würm III (28,000 B.P.; Vilette, 1983); Creete (Weesie, 1988); Spain (Würm II of Cova Negra; Eastham, 1989). Also a record from the Roman epoch of Mallorca is reported by Ballmann and Adrover (1970).

As a whole, this review shows that the Alpine swift during the Pleistocene was confined to the southernmost regions of the European continent, but not out of Europe. Bulgarian finds of the Riss-Würm interglacial of the Cave No, 16 indicate that mass presence and colonial breeding of *A. melba* in the Northern Balkans during the warmer periods may occur.

#### PRESENT AND PAST DISTRIBUTION OF *APUS APUS*

The other swift, established in the Cave No 16, *Apus apus*, is also a migratory species, breeding from Boreal to Warm Temperate zones. It breeds on the rocks, in caves, ground cavities, tree-holes, etc. (Harrison, 1982). The mean 12,7-July isotherm forms the breeding range of the species (Eastham, 1988). It is spread in Europe at present mainly in temperate zone. According to Voinstvenskiy (1960) *A. apus* is a southern species of mountain origin. The major extension of its range occurs in the Holocene as it depends on the stone human buildings in the settlements. The Quaternary records of *A. apus* include England, Monaco, Sardinia, continental Italy, Corsica and Hungary (Brodkorb, 1967). We have found additional information on the Pleistocene distribution of that species in the following sites: Suren I (Crimea; Tougarinov, 1937; Voinstvenskiy, 1960); Grotta dei Fanciulli (in Balzi Rossi-Italy; Campana, 1946); Palestine (Tchernov, 1962); Hundsheim (Austria; Janossy, 1974); sites in southern France and Catalonia (Spain) (Vilette, 1983); Creete (Weesie, 1988); France (Grotte du Lazaret; Vilette, 1993) and the cave Jean-Pierre 1 (Mourer-Chauviré, 1994) and Oblazowej (Poland; Tomek and Bochenski, 1995).

#### PRESENT AND PAST DISTRIBUTION OF *APUS PALLIDUS*

The third swift, *Apus pallidus* (Shelley, 1870) has no fossil record throughout the country. In Western Palearctic it is a migratory species, whose breeding range

covers the Mediterranean. It nests on rocks of rocky islands and cliffs, in dry rocky terrains in the inland, etc. (Harrison, 1982). Eastham (1988) writes, that there are no Pleistocene record of that species in Europe. Recently several Pleistocene sites have been published: Grotte du Lazaret (France; Vilette, 1993); sites in southern France and Catalonia (Spain; Vilette, 1983) and a Holocene record of Um an-Nar in Oman (4,500-3,000 B.C.; (Hoch, 1991). No finds of *A. pallidus* have been recovered in the Cave No 16.

#### PALAEOECOLOGICAL NOTES

A mesophilous microtheriofauna of forest-meadow type was established in the lower strata of the cave, while upper strata contain fossils of xerophilous steppe fauna (Popov and Delchev, 1997). The numerous bone finds of *A. melba* originate from the middle strata.

The avifauna of Temnata cave includes 48.3 % openland, 34.5 % woodland, and 17.2% petrophylous species (Boev, 1994). Thus, the character of the landscape may be determined as mosaic wooded steep. From the same list of species, it is shown, that about 66 % of the birds were resident (according to their present day populations on the Balkans).

At least 13 species of Micromammalia were established in the Cave No 16. Among them: *Talpa europaea*, *Crocidura leucodon*, *Sorex araneus*, *S. minutus*, *Microtus arvalis*, *M. subterraneus*, *Clethrionomys glareolus*, *Chionomys nivalis*, *Apodemus* cf. *flavicollis*, *Glis glis*, *Muscardinus avellanarius*, *Lagurus lagurus*, *Allactaga major*. This suggests that the climat ranged from temperate and humid to steppe "continental" in the different layers (Popov, 1994). From the analogy of present day biology of the species, the abundant flying insects during that period (40,000-18,000 B.P.) must be the main food resource of Alpine swifts from the Cave No 16.

The relatively fewer remains of *A. apus* can not be explained by smaller dimensions of its bones, because of the application of a precise flotation technic for the collecting of fossils. We consider that its smaller relative share in the collected material reflects the less population number in the paleornithocoenosys. Possibly, because of the competition of suitable nesting grounds, the smaller species, *A. apus*, was represented in a lower population density. As a species of larger body dimensions, possibly the Alpine Swift was preferred as a prey by the Eagle Owl (*Bubo bubo*) – the most probable accumulator of the studied fossil remains in the cave.

#### ACKNOWLEDGEMENTS

The avian bone material was collected and dated by the associated Micromammalian fauna by Dr. Vassil Popov (Institute of Zoology, BAS).

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