

Systematic palaeontology (Vertebrate palaeontology)

New evidence for the greater noctule bat (*Nyctalus lasiopterus*) in the Late Pleistocene of western Europe

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Received 21 April 2009; accepted after revision 25 May 2009

Available online 25 July 2009

Presented by Philippe Taquet

Abstract

This article reports a new record of the greater noctule *Nyctalus lasiopterus* (Schreber, 1780) in the Late Pleistocene of Europe. A fragment of a left mandible from this species was collected in Layer O (around 55 ka) from the Abric Romaní rock shelter, providing evidence of the presence of the greater noctule in north-eastern Spain during the latest Late Pleistocene. The relevance of this new record, which is geographically not reported up to now in the area, is discussed in terms of environmental changes. **To cite this article:** J.M. López-García et al., C. R. Palevol 8 (2009).

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Résumé

Nouvelle mise en évidence de la noctule géante (*Nyctalus lasiopterus*) dans le Pléistocène supérieur de l'Ouest de l'Europe. Cet article rapporte une nouvelle mention fossile pour la noctule géante *Nyctalus lasiopterus* (Schreber, 1780) dans le Pléistocène supérieur d'Europe. Un fragment de mandibule gauche appartenant à cette espèce a été récolté dans le niveau O (environ 55 ka) de l'Abric Romaní apportant la preuve de la présence de la noctule géante dans le Nord-Est de l'Espagne pendant le Pléistocène supérieur final. L'importance de cette découverte, située en dehors de la distribution géographique actuelle connue pour l'espèce en Espagne, est commentée et mise en relation avec des changements environnementaux. **Pour citer cet article :** J.M. López-García et al., C. R. Palevol 8 (2009).

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Keywords: *Nyctalus lasiopterus*; Biogeography; Palaeoclimate; Abric Romaní; Spain

Mots clés : *Nyctalus lasiopterus* ; Biogéographie ; Paléoclimat ; Abric Romaní ; Espagne

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1. Introduction

Bats (*Chiroptera*) represent the second most diversified order of mammals, accounting for one fifth of the extant mammal species [28]. Even though the fossil record of the group extends over 50 million years, these mammals are extremely rare as fossils. During the Tertiary and Quaternary, the fossil record of bats usually consists of fragments of bones and isolated teeth [16,17,21,27,31], although, in some cases, they may form an important part of the mammal fauna on account of their remarkable diversity, especially in the early part of the Quaternary [34]. While not extensive, however, the fossil record of bats shows that several species once had a very different geographical distribution from that seen today, as is the case with the vespertilionid greater noctule, *Nyctalus lasiopterus*, in the Iberian Peninsula. Vespertilionid fossils are virtually non-existent prior to the Miocene, when the deterioration of the climate, which led to the disappearance of tropical species, seems to have favoured their expansion and diversification at the end of the Neogene [11].

The vespertilionids apparently profited from the disappearance of these bats by taking a wider range of habitats [11]. Since the Middle Pleistocene the Spanish chiropteran fauna is almost identical to the present; the main differences reside in their abundance and geographical distribution [27].

In the last few decades a considerable effort has been made in the study of small mammals from cave deposits. About three quarters of the extant European species are known as fossils, though a distinct bias towards cave bats is observed [29].

The extant vespertilionid genus *Nyctalus* Bowditch, 1825 is represented in Europe by three species, all of which occur in Spain. At present, the greater noctule, *N. lasiopterus* (Schreber, 1780), is the largest European bat. Its recent distribution extends over Europe, West Asia and North Africa. Its habitat is linked to deciduous forests, using cavities in trees as daytime shelters. It is the only species in Europe known to prey on small birds [10,12]. In turn, it is occasionally a prey for *Tyto alba* and *Bubo bubo*.

Though noctules are rare as fossils, two of the recent European species have a Middle and Late Pleistocene record in localities in south-eastern Europe [14,27,30]. The recently discovered fossil from the Late Pleistocene deposits of the Abric Romaní rock shelter (Barcelona), in north-eastern Spain [18,19] (Fig. 1), adds a new record for the genus in Europe and would be the second for this species in Spain.

2. The locality

The Abric Romaní is a classical site with Neanderthal industries in a rock shelter. The site is near the town of Capellades, some 45 km to the northwest of Barcelona. Its geographical references are 1° 41' 30" east and 41° 32' north, and it lies about 310 metres above the present sea level. Its situation, between the contact of the basin of the River Anoia and the Catalan pre-littoral mountain range, constitutes a good enclave in the route between the Mediterranean littoral and the River Ebro inner basin. The shelter is carved in Quaternary travertine, and the Mousterian lithics preserved in the succession of layers provide evidence that Neanderthals occupied the site at different moments within what is known as Marine Isotopic Stage 3 (MIS 3), about 70–40 ka [7]. The excavations at the site have been conducted in three different periods, the first of which extended from 1909 to 1929, the second from 1956 to 1961, while the present excavations, to which this paper refers, started in 1983 [8]. Sampling for pollen analysis at different levels of the succession shows changes in the structure and composition of the vegetation over time, leading to the differentiation of five distinct palaeoclimatic phases [1,6]. Level O, to which this paper refers, is placed in phase number three, dated between 56.8 and 49.5 ka, characterized by alternating temperate and cold events. The uranium series method, applied to the package of sediments that include level O, has given dates between 54.9 ± 1.7 kyr and 54.1 ± 1.6 kyr [3].

3. Description

The greater noctule bat material was obtained after sieve-washing the sediments excavated at level O during the 2004 to 2006 campaigns. The 2 mm mesh retained, together with other small mammal remains, the anterior half of a left mandible with a fourth premolar and two molars, which was recognised as belonging to a large bat species. To determine the genus, features such as the shape of the symphysis, the position of the mental foramen, the number of premolars, and the talonid pattern of the molars were considered. Differences in size and more detailed features of the dental morphology were used for determination at species level, as well as direct comparison with recent specimens loaned from different institutions. The terminology used to describe the teeth follows Van Valen [33], with modifications introduced by several authors [21,26] to describe specific dental features in bats. Measurements were taken following Sevilla [27], using an Olympus SZ-11 binocular

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