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Avian remains from new Upper Pleistocene and Holocene sites in the Spanish Pyrenees

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ABSTRACT

Despite the interest of birds in reconstructing ancient environments, there are but few works concerning Quaternary avian remains. We have the opportunity to show in the present paper, the fossil avian remains of one of the more interesting natural, high-mountanous regions in southern Europe: the Spanish Pyrenees. In the central part of the Pyrenees, in the province of Huesca, Spain, five new paleontological sites with bird remains have been described: La Brecha del Rincón B-9 cave, the B-8 cave (Secús Range), Los Batanes C-4 (Tendeñera Range), and C-15 and D-2 (Lecherines System). Their ages range from the Upper Pleistocene up to the Holocene. At least twenty three taxa are recorded: Galliformes indet., *Lagopus muta*, *Coturnix coturnix*, *Bonasa bonasia*, *Rallus aquaticus*, *Columba oenas*, *Columba palumbus*, *Columba* sp., Passeriformes indet., *Ficedula hypoleuca*, *Ficedula* sp., *Lanius* sp., *Coccothraustes coccothraustes*, *Phoenicurus ochruros*, *Oenanthe oenanthe*, Corvidae indet., cf. *Perisoreus infaustus*, *Corvus frugilegus*, *Corvus monedula*, *Pyrrhocorax* sp., *Pyrrhocorax pyrrhocorax*, *Pyrrhocorax graculus*, and Aves indet. In this work we present the highest-altitude paleontological record for *Coturnix coturnix, Bonasa bonasia, Columba palumbus,* and *Corvus frugilegus,* and the southernmost record of cf. *Perisoreus infaustus*. The new data go some way towards filling the gap in our information on avian assemblages in the Aragonese Pyrenees (especially by comparison with the vast knowledge that exist on the avian assemblages of the French Pyrenees sites) as well as the gap in what is known about avian assemblages in high-mountain systems, for La Brecha del Rincón B-9 and B-8 are the highest-altitude avian paleontological assemblages described in the Pyrenees Range.

1. Introduction

The Quaternary paleontological record in the Aragonese Pyrenees is scarce. Only a few sites have been analyzed in depth: Gabasa (Blasco-Sancho, 1995), Las Fuentes de San Cristóbal (Menéndez-Granda et al., 2009), Millaris (García-González, 2012), Coro Tracito (Rabal-Garcés et al., 2012; Rabal-Garcés, 2013), and La Brecha del Rincón (Rabal-Garcés and Sauqué, 2014, 2015). The scarcity of such papers represents a notable contrast with the large amount of sites analyzed on the French side of the range (Clot and Evin, 1986), which go back to the second half of the 19th century (Philippe, 1852; Milne-Edwards, 1875).

In discussions on the Quaternary avian record, almost all the information comes from the French side of the Pyrenees (Clot and Mourer-Chauviré, 1986; Crégut-Bonnoure et al., 2014; Lebreton et al., 2016) (Fig. 1). Bird remains have been studied in Quaternary localities in Spain (Sánchez-Marco, 2005; Guerra et al., 2012; Núñez-Lahuerta et al., 2016), and also in some localities in the Pyrenees, mostly in the Basque Country (Eastham, 1985; Elorza, 1990), Navarre (Villalta, 1964; Altuna et al., 2002) and Catalonia (Garcia i Petit, 1995, 2002, 2005; Sánchez-Marco, 2002). However, there is only one locality in the Aragonese Pyrenees where the avian assemblage has been analyzed: the Mousterian site of Gabasa I, where a new species of vulture was described (Hernández-Carrasquilla, 2001).

This imbalance in the number of papers on the bird assemblages of the Late Pleistocene and Holocene of the Aragonese Pyrenees makes it difficult, or even impossible, to compare the northern and the southern sides of this important range. The Late Pleistocene was characterized by major climatic changes (Naughton et al., 2016; Sánchez-Goñi and d'Errico, 2005), and the Pyrenees acted as a refugium for cold taxa during the interglacial periods (López-García

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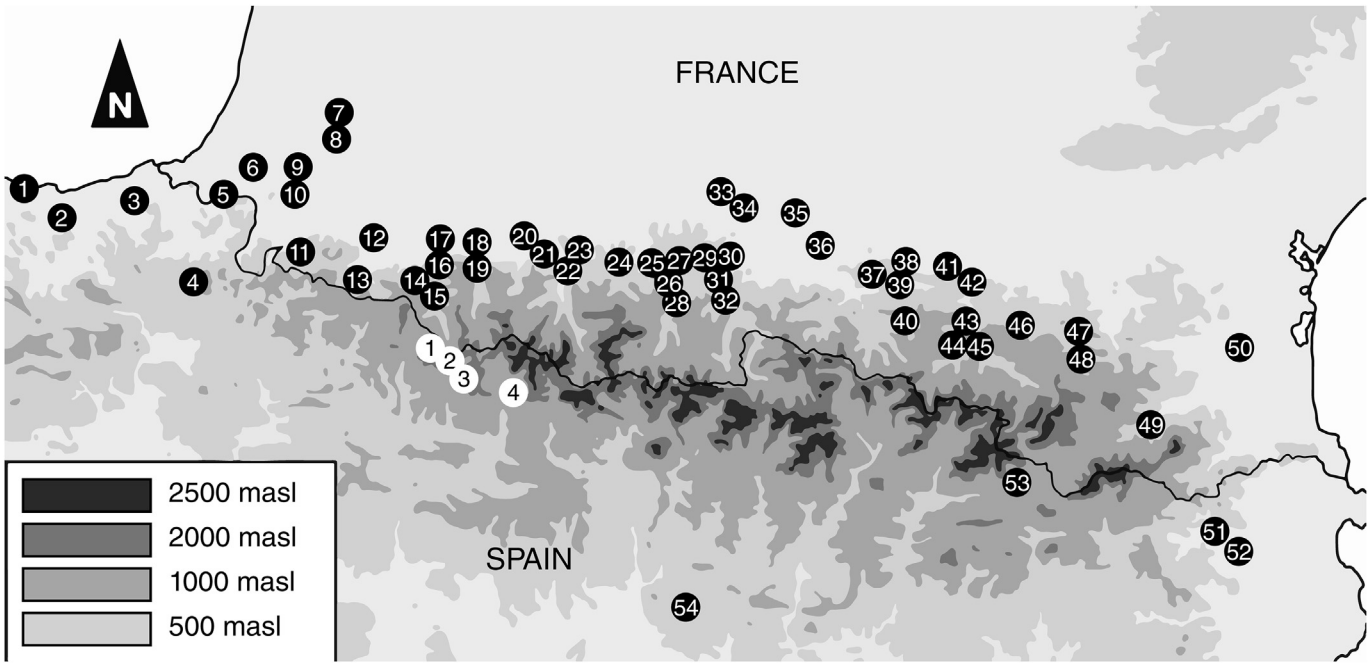

Fig. 1. Pyrenees site map. The black dots represent the location of known paleontological sites with avian remains: 1-Urtiaga (Elorza, 1990); 2-Erralla (Eastham, 1985); 3-Abrigo de Aitzbitarte (Elorza, 1990); 4-Abauntz (Altuna et al., 2002); 5-Cueva de Berroberria (Villalta, 1964); 6-Abri Olha (Passemard, 1924); 7-Grotte Duruthy (Delpech, 1975); 8-Grotte Bourrouilla (Eastham, 1998); 9-Isturitz (Bouchud, 1952); 10-Unikote (Michel, 2005); 11-Grotte des Sources de la Nive (Clot, 1985b); 12-Grotte Gatzarria (Clot and Mourer-Chauviré, 1986); 13-Grotte Uthütti Kotxe punta (Clot, 1985b); 14-Gouffre PT10 (Clot, 1985b); 15-Trou 824 du Massif de l'Oueillarraise (Clot, 1985b), Grotte Napia (Clot, 1985b); 16-Gouffre Cousté (Clot, 1985b); 17-Tutte de Carrelore (Astre, 1947); 18-Grotte de Junqua (Clot and Mourer-Chauviré, 1986); 19-Grotte du Bois de la Tournarie (Clot, 1985b); 20-Grotte de Monrepos (Clot and Mourer-Chauviré, 1986); 21-Grotte Noëlle (Clot and Mourer-Chauviré, 1986), Gouffre TP11 (Clot, 1985b), Gouffre du Haut de la Coume des Arrats (Clot, 1983), Grotte d'Escurens (Clot, 1983), Porche de la Bouhadère (Clot and Mourer-Chauviré, 1986), Petit Gouffre près du Soum d'Ech (Clot, 1985b), Gouffre Monjouste (Clot, 1983); 22-Grotte des Chocards (Clot, 1983); 23-Abri effondré du Calvaire (Clot and Mourer-Chauviré, 1986), Grotte de Castillet (Clot, 1985b), Grotte des Espéluges (Mourer-Chauviré, 1975), Grotte de la Chèvre (Clot and Mourer-Chauviré, 1986); 24-Grande Grotte de Bédat (Clot, 1985a), Grotte d'Aurensan (Bouchud, 1972); 25-Bois du Cantet (Clot et al., 1984); 26-Grotte de Labastide (Clot, 1985a); 27-Grotte de Brebis (Clot, 1985a); Grotte de Lortet (Clot and Mourer-Chauviré, 1986); 28-Grotte de Couret (Clot, 1985a); 29-Grotte de Gargas (Bouchud, 1958); 30-Grotte de Gourdan (Milne-Edwards, 1875); 31-Puits de Peyreignes (Clot and Mourer-Chauviré, 1986), Grotte de Tibiran (Clot and Mourer-Chauviré, 1986); 32-Grotte-abri du Moulin (Clot, 1985a), Grotte de Saint Arailles (Clot, 1985a); 33-Grotte Sous la Chapelle de Saint Brice (Clot, 1985a); 34-Grotte des Rideaux (Saint-Périer, 1924), Grotte des Chiens (Clot, 1985a), Grotte des Harpons (Saint-Périer, 1921), Grotte de Gouërris (Saint-Périer, 1927); 35-Grotte de Aurignac (Milne-Edwards, 1875); 36-Grotte de Tarté (Mourer-Chauviré, 1975), 37-Grotte des Trois Frères (Mourer-Chauviré, 1975), 38-Mas d'Azil (Vilette, 1983); 39-Grotte de las Buffios (Clot and Mourer-Chauviré, 1986); Grotte de Soulabé (Mourer-Chauviré, 1975); Grotte de Malarnaud (Mourer-Chauviré, 1975); 40-Grotte de Massat (Milne-Edwards, 1875); 41-Grotte du Portel (Clot and Mourer-Chauviré, 1986); 42-Tutto de Camayot (Astre, 1939); 43-Abri Rhodes (Delpech, 1975), 44-Grotte de la Vache (Koby, 1957); 45-Grotte des Eglises (Delpech, 1975), 46-Grotte de las Morts (Astre, 1942); 47-Cauna de Belvis (Vilette, 1983); 48-Abri de Dourgne (Vilette, 1983); 49-Grotte d'Embulla (Vilette, 1983); 50-Grotte Noire (Vilette, 1983), Grotte l'Arago (Mourer-Chauviré, 1975); 51-Cova d'els Colls (Garcia i Petit, 2005), 52-Cueva Davant Pau (Garcia i Petit, 1995), L'Arbreda (Garcia i Petit, 2002), Reclau Viver (Garcia i Petit, 2002); 53-Cau d'Olopte (Sánchez-Marco, 2002); 54-Gabasa (Hernández-Carrasquilla, 2001). The white dots represents the location of the new sites presented in this work. 1-La Brecha del Rincón (B-9) and B-8 caves; 2-D-2 cave; 3-C-15 cave; 4-Los Batanes (C-4) cave.

et al., 2010).

The main aim of the present work is to increase what is known about the Spanish side of the Pyrenees, in order to allow comparison between the two sides of the range. To this end, five recently discovered sites have been analyzed (Fig. 1): La Brecha del Rincón B-9 cave, the B-8 cave (both belonging to the Secús Range), Los Batanes C-4 cave (Tendeñera Range), and the C-15 and D-2 caves (both belonging to the Lecherines System). As well as adding to our information on Upper Pleistocene and Holocene assemblages, the interest of these new sites is that they are high-lying mountain localities, with altitudes ranging from 1025 m above sea level (Los Batanes) to 2160 masl (La Brecha del Rincón). This makes these sites the highest-lying sites above sea level with avian remains in the Pyrenees, and they are among the highest paleontological sites in Europe. Such localities are scarce in the paleontological record due to the logistical difficulties of reaching and analyzing caves at these heights.

2. Pyrenees sites

Eight new high-lying mountain sites were discovered by the Centro de Espeleología de Aragón (CEA), and the paleontological prospection and excavation were carried out by the Aragosaurus Group headed by R. Rabal-Garcés and V. Sauque in the summers of 2014 and 2015. Five of these sites revealed an accumulation of bird remains (Fig. 1). In the following sections these sites are described, and the data are summarized in Table 1.

2.1. Secús range

The Secús Range is an east-west aligned mountain chain, located in the westernmost part of the Aragonese Pyrenees; it reaches 2514 masl (Puntal de Secús). Two caves with avian remains were discovered in this range: La Brecha del Rincón (B-9) and the B-8 cave, both located in Hecho (Huesca, Spain). These caves are among the highest-lying paleontological sites in Europe, and they are the highest paleontological sites with analyzed bird remains in the Pyrenees (Fig. 1).

2.1.1. La Brecha del Rincón (B-9)

The cave La Brecha del Rincón (30T 692325 4741635), henceforth B-9, is a karst cave that opens at 2160 masl (Fig. 1). It is more than 2.5 km in length and has an altitude difference of more than 250 m (Fig. 2). The main objective of the paleontological

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