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Bird-bone modifications by Iberian lynx: A taphonomic analysis of non-ingested red-legged partridge remains

Antonio Rodríguez-Hidalgo [a, b, c, *], Palmira Saladié [a, b, d, e, **], Juan Marín [a, b, c], Antoni Canals [a, b, c]

[a] IPHES, Institut Català de Paleoecologia Humana i Evolució Social (Catalan Institute of Human Palaeoecology and Social Evolution), Zona educacional, Campus Sescelades URV (Edifici W3), 43007 Tarragona, Spain
[b] Àrea de Prehistòria (Department of Prehistory), Universitat Rovira i Virgili (URV), Avinguda de Catalunya 35, 43002 Tarragona, Spain
[c] Equipo Primeros Pobladores de Extremadura, Casa de la Cultura Rodríguez Moñino, Avda. Cervantes s/n, 10003 Cáceres, Spain
[d] GQP-CG, Grupo Quaternário e Pré-História do Centro de Geociências (ul&D 73 e FCT), Portugal
[e] Unit Associated to the Centro Superior de Investigaciones Científicas (CSIC), Spain

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ABSTRACT

The Iberian lynx (*Lynx pardinus*) is a significant taphonomic agent in Iberian ecosystems. Its diet is based almost exclusively on rabbits and it is complemented mainly with birds from the *Phasianidae*, *Anatidae* and *Corvidae* families. We present here the results of actualistic taphonomic research conducted to assess modifications produced by Iberian lynx on non-ingested red-legged partridge (*Alectoris rufa*) remains. Through anatomical representation, breakage patterns and bone surface modifications we were able to establish the main characteristics of the taphocoenosis of the Iberian lynx regarding one of their complementary preys. The results revealed low survival of entire carcasses, remains mainly of offal and feathers – that are barely preserved in archaeological fossil records –, and some skeletal remains. Anatomically there was greater evidence of thoraxes, especially pelvis/synsacrum and adjoining ribs, and distal portions of wings and legs. Breakage was nominal with a high survival of whole elements, but none of the major long-bone remains were complete. The bones in the meaty parts (wings/humeri, drumsticks/femurs and tibiae and breasts/sternums), were very fragmented. Tooth marks were rare and occurred mainly in the form of notches on fractured edges none of which had opposite tooth marks. A comparison of our results with those obtained for the main prey of lynxes – rabbits – indicated a lower survival of bird remains. This differential taphonomic pattern must be related to the anatomy of the prey and the anatomical distribution of meaty parts which are the main interest of the predator.

1. Introduction

Avian remains are common in archaeological sites and several taphonomic processes and agents may contribute to their accumulation. Bocheński (2005) proposed three possible origins for the bird accumulations: intrusive (by natural death); exogenous through the intervention of predators other than humans (mainly carnivores and raptors); or anthropogenic. In addition, the possibility of mixed origins of bird remains and other small animals is usual in archaeological contexts (e.g. Rosado-Méndez et al., 2014; Rufà et al., 2014).

Non-human predators are well-known bird-bone modifiers and accumulators. Some of them have been studied in depth from a taphonomic perspective, offering us methodological tools to recognise their taphonomic signals in the palaeobiological record (e.g. Bramwell et al., 1987; Ericson, 1978; Andrews, 1990; Bocheński et al., 1993; Bocheński et al., 1997, 2009a; Bocheński, 2005). Among predators, modifications and accumulations generated by birds of prey have been studied extensively. Conversely, taphonomists have focused less attention on bird bones modified by carnivorous mammals.

Regarding humans, prior to the Upper Palaeolithic, it was not traditionally thought that hominids had contributed to the formation of bird-bone accumulations. In this sense, bird bones from

* Corresponding author. IPHES, Institut Català de Paleoecologia Humana i Evolució Social, C/Marcel·li Domingo s/n, Edifici W3, Campus Sescelades URV, 43007 Tarragona, Spain.
** Corresponding author. IPHES, Institut Català de Paleoecologia Humana i Evolució Social, C/Marcel·li Domingo s/n, Edifici W3, Campus Sescelades URV, 43007 Tarragona, Spain.
E-mail addresses: ajrh78@gmail.com (A. Rodríguez-Hidalgo), palmira.saba@gmail.com (P. Saladié).

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most of the assemblages from the Lower and Middle Palaeolithic were studied only from a palaeontological and palaeoecological point of view. However, current data indicate that the exploitation of birds is much earlier and more common than previously believed. Older evidence of the use of birds by hominins was identified at the Early Pleistocene site of Sima del Elefante (Atapuerca, Burgos, Spain). In a large-bird radius of this assemblage, cut marks can be seen in the area close to the shaft (Huguet et al., 2013). Other studies have shown that avian resources were important in the diets of Neanderthals in the Bolomor Cave (Spain) and in Gorham's Cave (Gibraltar). Taphonomical studies of these sites have offered evidence of the exploitation of mute swans, diving ducks and rock doves (Blasco and Peris, 2009; Blasco et al., 2014). In addition, bird exploitation during the Middle Palaeolithic has also been linked to non-food use, as inferred by a presumed symbolic use of feathers and claws from large birds (Peresani et al., 2011; Finlayson et al., 2012; Morin and Laroulandie, 2012). Finally, in the later cultures of the Upper Palaeolithic and during the Holocene, there was a substantial increase in the exploitation of birds in the context of Broad Spectrum Revolution (e.g. Aura and Pérez Ripoll, 1992, 1995; Aura et al., 1998; Stiner et al., 2000; Aura Tortosa, 2001; Aura-Tortosa et al., 2002; deFrance, 2005), with a significant increase of bird accumulations of anthropogenic origin.

The signals usually used to infer human handling of bird remains are cut marks and burned bones (Solomon et al., 1986; Ericson, 1978; Steadman et al., 2002; deFrance, 2005; Blasco and Peris, 2009). Nevertheless, in the context of small-game fossil assemblages, differentiating the remains accumulated by humans from those accumulated by other agents is a difficult task because the carcasses of small prey can be processed and consumed by humans without tools and/or in the absence of fire (Livingston, 1989; Lyman, 1994; Higgins, 1999; Laroulandie, 2001; Steadman et al., 2002; Blasco et al., 2013, 2014). Hence, properly characterising the taphonomic signal of the different agents in relation to several kinds of prey is essential for understanding archaeological faunal assemblages.

The Iberian lynx (*Lynx pardinus*, Temminck, 1827) is a medium-sized feline, endemic to the Iberian Peninsula (Rodríguez and Delibes, 1990) (Fig. 1a). It is a specialist predator of the European rabbit, a species which makes up between 85 and 100% of its diet. Birds are the second component of the lynx's diet, in particular ducks, red-legged partridges and magpies, depending on environmental and seasonal availability (Delibes, 1980). This felid has been

Fig. 1. a) Adult specimen of Iberian lynx: photo from the Iberian Lynx Ex-situ Conservation Programme; b) adult specimen of red-legged partridge, photo by Juan Lacruz (under CC license); c) example of recovered remains after treatment.

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