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When Neanderthals used cave bear (*Ursus spelaeus*) remains: Bone retouchers from unit 5 of Scladina Cave (Belgium)

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A R T I C L E I N F O

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A B S T R A C T

Evidence of Neanderthals using bear remains as retouchers is rare. In the sedimentary unit 5 of Scladina Cave (Belgium; Weichselian Early Glacial, MIS 5d to 5b), twenty-six bone retouchers have been discovered. Among these, six have been made from cave bear bones (four from a femur and two from two tibiae). The presence of lithic splinters, still embedded in grooves, can be convincingly associated with their function as knapping tools. Particularly interesting are six bone fragments, including four fragments used as retouchers and two unused splinters, which have been refitted together to reconstitute an almost complete cave bear femur diaphysis. These specimens present modifications in the form of cut marks, scraping marks, impact notches and typical fractures of percussions on green (fresh) bone, sometimes overlapping each other, that allow for a complete understanding of the operational sequence in the production of bone retouchers at this site. The identification of a sophisticated operational sequence, where each action succeeds another in the production of a bone tool, is a major argument in favor of predetermination that guided the Neanderthal actions, and is similar to that described for stone tool *chaîne opératoire*.

1. Introduction

Palaeolithic bone retouchers have been known since the second half of the 19th century. Bone retouchers are tools made from bones, antlers or teeth, which bear marks, in the form of pits and scores (according to Mallye et al., 2012), resulting from their intentional and repeated striking (knapping) of lithic raw material. One of the first reference to these finds come from the Palaeolithic context of *Trou Magrite* (Walzin, Belgium), where they have been described as bones "*intentionnellement brisés et portant des traces de coups artificiels et des entailles*" (intentionally broken bones, wearing artificial blow marks and grooves; Dupont, 1871: 39). In 1889, one bone tool coming from the *l'Église* Cave excavations (Dr. Capitan's collection) was called "*retouchoir en os*" (bone retoucher) and illustrated in the catalogue of the International Exhibition of Paris (Société d'Anthropologie de Paris, 1889, Fig. 127: 217). Since then, it has become more common to find and recognise these humanly modified objects among faunal remains from European Palaeolithic sites. Their use has been long debated (Patou-Mathis and Schwab, 2002), sometimes interpreted as hammers or anvils (Henri-Martin, 1910), compressors (Commont, 1916) or push needles (Bourlon, 1916). In some case, their anthropogenic origin has been strongly contested. L.R. Binford (1981), for instance, described the bone modifications as the result of carnivore chewing. Taphonomic studies have highlighted the distinction between gnawing and knapping marks (Giacobini and Patou-Mathis, 2002; Malerba and Giacobini, 2002; Tartar, 2012). Re-analysis of already known collections such as La Ferrassie (France; Castel et al., 2003) or La Quina (France; Verna and d'Errico, 2011) and the results of new experimental works (Chase, 1990; Rigaud, 2007; Mallye et al., 2012; Tartar, 2012; Bello et al., 2013a) have also confirmed the use of this type of unsophisticated tools as retouchers during the Middle and Upper Palaeolithic. This is particularly illustrated by the presence of lithic splinters still embedded in grooves.

The earliest record of a soft hammer used for knapping is dated to the Lower Palaeolithic for the site of Boxgrove (West Sussex,

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England; Roberts and Parfitt, 1999). The record intensifies during the Middle Palaeolithic: e.g., in France: Artenac (Armand and Delagnes, 1998), Biache-Saint-Vaast (Auguste, 1995; Auguste, 2002), Jonzac (Jaubert et al., 2008), La Quina (Henri-Martin, 1906; Chase, 1990; Verna and d'Errico, 2011), Noisetier Cave (Mallye et al., 2012), Saint-Marcel Cave (Daujeard, 2004), Combe-Grenal and Vaufrey caves (Vincent, 1993); in Italy: Fumane Cave (Jéquier et al., 2012); in Czech Republic: Kulna Cave (Vincent, 1993; Auguste, 2002; Neruda et al., 2011); in Croatia: Vindija Cave (Ahern et al., 2004). Their use continues at the very least into the Upper Palaeolithic (Leroy-Prost, 2002; Castel et al., 2003; Tartar, 2012).

During Middle Palaeolithic, bone retouchers were made from bones, teeth and antlers (Patou-Mathis and Schwab, 2002); more often, from herbivores (e.g., Armand and Delagnes, 1998; David, 2002; Patou-Mathis and Schwab, 2002; Valensi, 2002; Neruda et al., 2011; Jéquier et al., 2012; Mallye et al., 2012), and rarely from carnivore (Auguste, 2002; Jéquier et al., 2012) or hominin remains

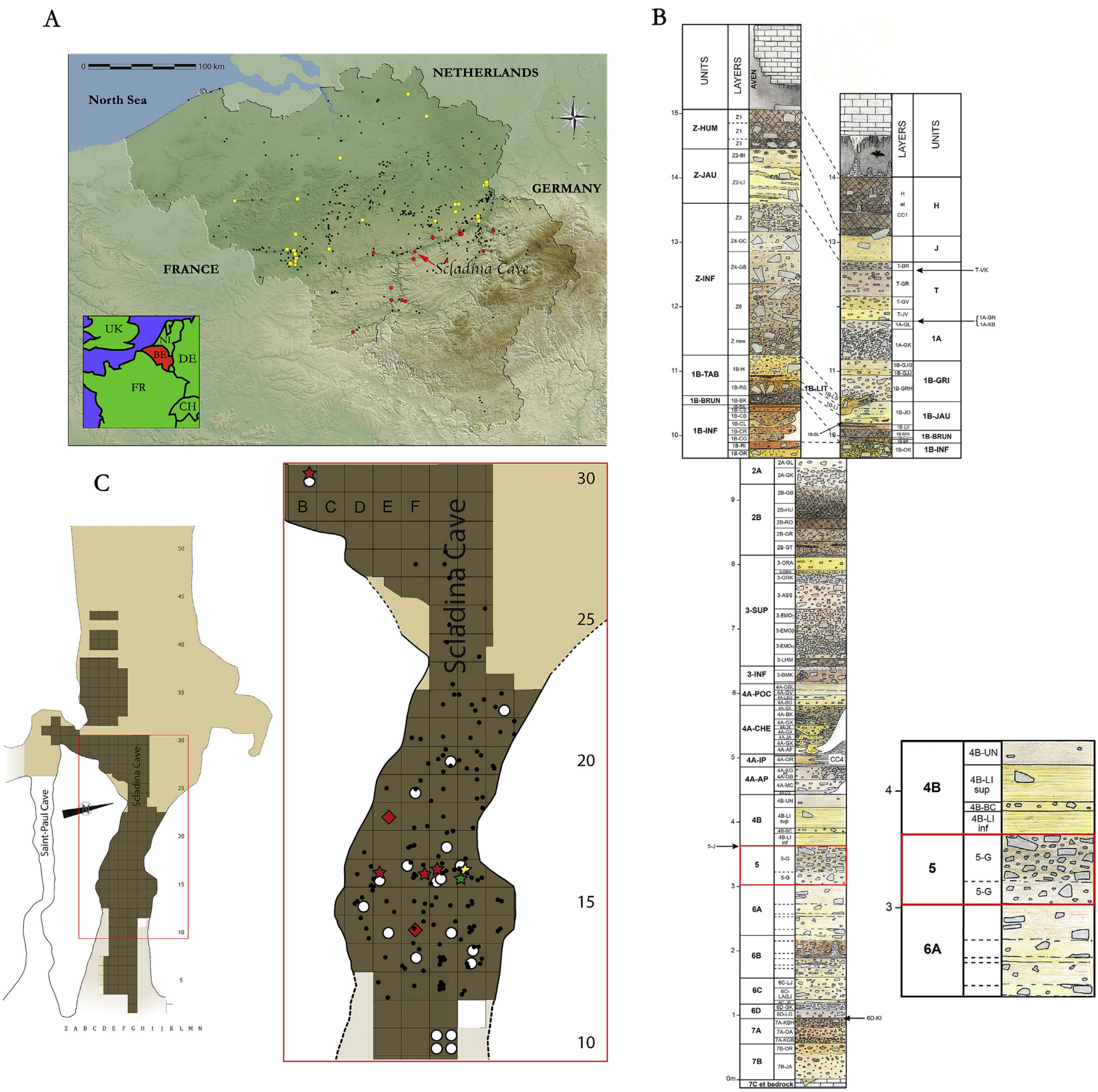

Fig. 1. (A) In Belgium, 442 Middle Palaeolithic occurrences are known. The main open area sites are located in yellow while the main caves are located in red (for more details, see Di Modica, 2011). (B) Stratigraphic sequence of Scladina Cave (for more details, see Pirson et al., 2008). (C) Map of the cave: the sedimentary unit 5 excavated area is coloured in dark brown; the stars represent the location of the bear bone retouchers (in red: fragments of the right femur; in yellow: fragment of the right tibia; in green: fragment of the left tibia; also refer to Table 3); the red diamonds represent the two unused bear bone splinters; the white dots represent the location of all other bone retouchers identified in the faunal collection of sedimentary unit 5 (also refer to Table 2); the black dots represent the lithic tools (modified from Otte and Bonjean, 1998, Fig. 16, p. 363). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)