

Tool-making Bones from the Schöningen 13II-4 Spear Horizon

Introduction

Schöningen 13II-4 has received much attention for the remarkable discovery of well-preserved wooden spears and Middle Pleistocene fauna dating to ~300,000 years ago (MIS 9). In 2012, the Monrepos Archaeological Research Centre and Museum for Human Behavioural Evolution initiated a research program to investigate the unique depositional history of the Schöningen 13II-4 Spear Horizon. Our research strategy constitutes a thorough evaluation of the entire archaeological record and sedimentary sequence in order to contextualize hominin activities across the wider interglacial, lake-shore landscape at Schöningen. Among the estimated 15,000 bones in the complete assemblage, we have identified 97 bones, variously described as retouchers, compressors, and percutors¹, that show damage consistent with the maintenance and manufacture of stone tools. Here we describe these tool-making bones from the Schöningen 13II-4 Spear Horizon and provide a functional and behavioral context for their use.

Middle Pleistocene Bone Retouchers

The earliest bone and antler retouchers from Boxgrove (UK) and Caune de l'Arago (France) demonstrate the Middle Pleistocene origins of this technology, possibly as far back as MIS 13. After that time bone retouchers only appear again during MIS 9 in Western Europe (e.g., Cagny l'Épinette, La Micoque, and Orgnac 3 in France, and Bolomor Cave, Cueva del Ángel, and Gran Dolina in Spain) and in the Levant (Qesem Cave, Israel). These tool-making bones emerged at a time of broad technological upheaval, when the large bifacial tools that record the final stages of the Lower Paleolithic gave way to the development of post-Acheulean, prepared-core technologies of the Middle Paleolithic. The presence of bone retouchers increased substantially throughout the Middle Paleolithic, occurring at numerous sites ranging across Western and Central Europe to as far east as Ukraine during Marine Isotope Stages 7-3. Overall, bone retouchers are relatively rare in early archaeological contexts, but hold great research potential for understanding the origins of bone tool use during the Paleolithic and how this technology developed over time. At the core of this issue is where and when our hominin ancestors began to use bones to create and modify stone tools, and, more importantly, how and why Middle Pleistocene hominins ceased to consider bones as sterile by-products of the hunting and butchery process and began to recognize its technological utility for making stone tools.

Schöningen Tool-making Bones

In total, 97 of the roughly 12,000 Schöningen bones analyzed bear traces of use in the production and maintenance of stone tools. The collection may be even larger, as the bone implements from the Schöningen 13II-4 Spear Horizon reported elsewhere were not available for study³. Consistent with the overwhelming majority of horse (*Equus mosbachensis*) remains in the assemblage, more than 90% (90 of 97) of the implements are made from horse bone, and the remainder are of bovid bone (*Bos primigenius* or *Bison priscus*). Despite the presence of cervid remains at the site, including antler, none were used as retouchers. The spatial arrangement of the bone implements closely tracks the overall distribution of lithic debris across the site (Figure 1), which further attests to their use in the butchery process.

A majority of the utilized bones are classic retouchers made from small, limb bone mid-shaft fragments (Figure 2). Most retouchers (n=76) display sharply-incised damage and hatched areas consistent with use in a relatively fresh state, while others (n=12) show rough incisions and scaled areas that indicate the use of comparatively dry bone in the manufacture of stone tools⁴. Nearly all retouchers, whether fresh or dry, include heavy scraping marks likely related to the removal of the periosteum or other adhering tissues. The damage is typical of retouch marks reported from archaeological and experimental studies, with concentrated and superimposed incisions indicating use over an extended period of time. Conversely, several examples include fewer, shallower marks dispersed across the bone surface. This damage may be produced by pressing the thin edge of a lithic tool into the bone rather than swinging the bone against the tool. Several complete or nearly complete bones include typical retouch damage along with numerous pits and scrapes possibly related to use as anvils. In addition to limb bones, 10 ribs also show retouch marks, most often on the medial side toward the rib head. A further 15 limb bones (12 metapodials and three humeri) preserve damage to the epiphyses related to their use as soft hammers (Figure 3). Based on limited experimental studies, at least one of the soft hammers appears to have been used when relatively dry. Conspicuous in the representation of limb bones is the relative lack of metacarpals and metatarsals in the overall assemblage. This may indicate the selective removal of metapodials for later use at other locations across the landscape. Among the limb bones used as soft hammers, six also include retouch damage along the shaft.

With such a wide variety of bones used to shape and modify lithic tools, bone was a useful resource for Middle Pleistocene hominins at Schöningen. We hypothesize that the bone retouchers were used in light-duty tasks of trimming tool and flake edges, while the soft hammers better served as heavy implements for detaching flakes from cores.

Figure 1. The spatial distribution of bone retouchers and soft hammers from the Schöningen 13II-4 Spear Horizon closely mirrors the overall arrangement of lithic debitage and tools scattered across the site. The complete lithic assemblage, amounting to roughly 1500 total pieces, consists of mostly chert debitage and expedient flakes, a small number of formal tools, and few large cobbles useful for hammerstones. The lithic debris and bone implements also overlaps with the main bone concentration, indicating their use in the butchery process. With the abundance of bone, both fresh and dry, and the relative lack available lithic material, bone likely replaced stone hammers in the manufacture and maintenance of lithic tools for butchery.

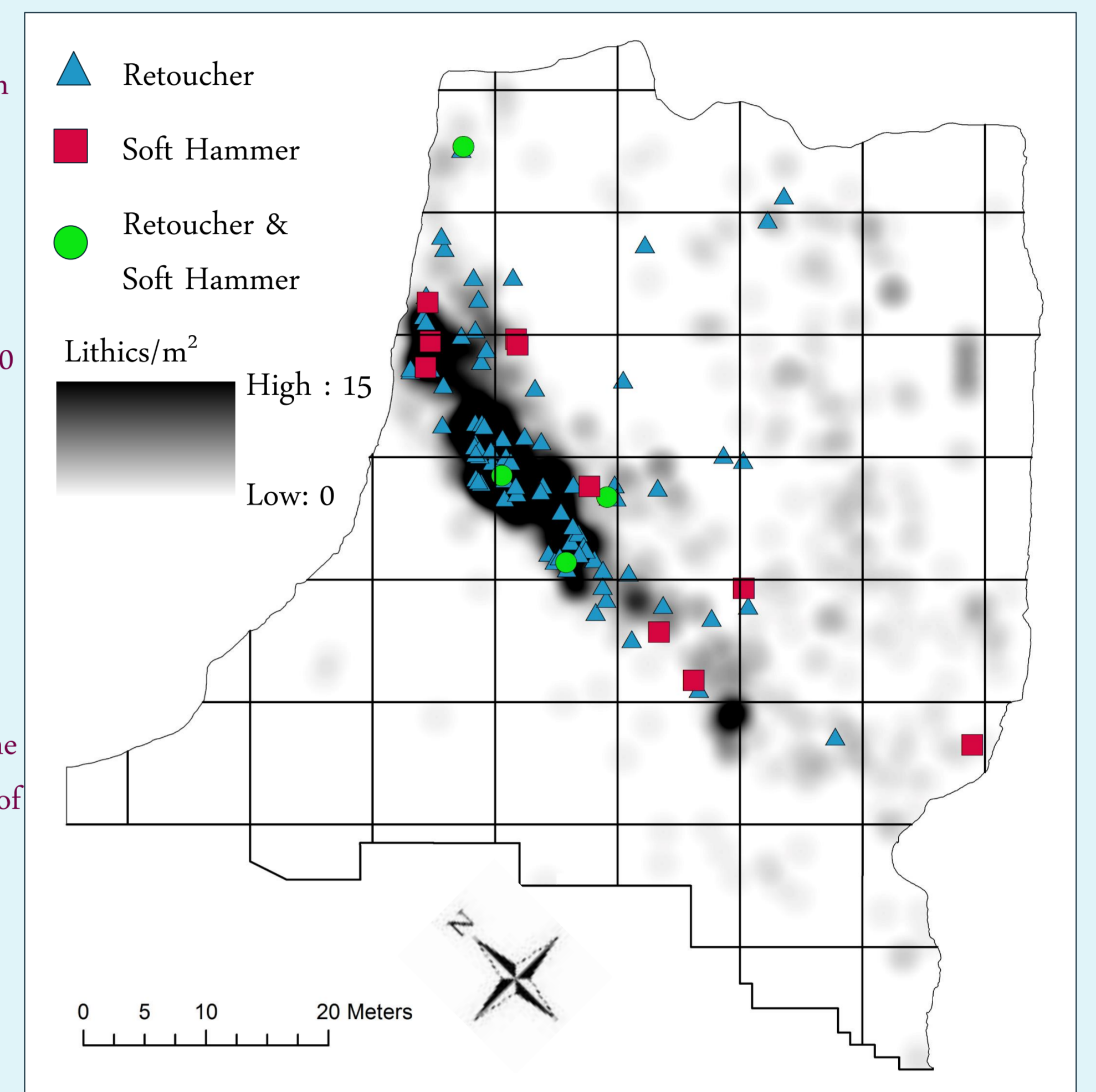


Figure 2. Bone retouchers from the Schöningen 13II-4 Spear Horizon. The limb bone shaft on the left shows dense concentration of hatching marks typical of use in a fresh state. The specimen on the right displays scaled areas and one longitudinal fracture indicating use when relatively dry.



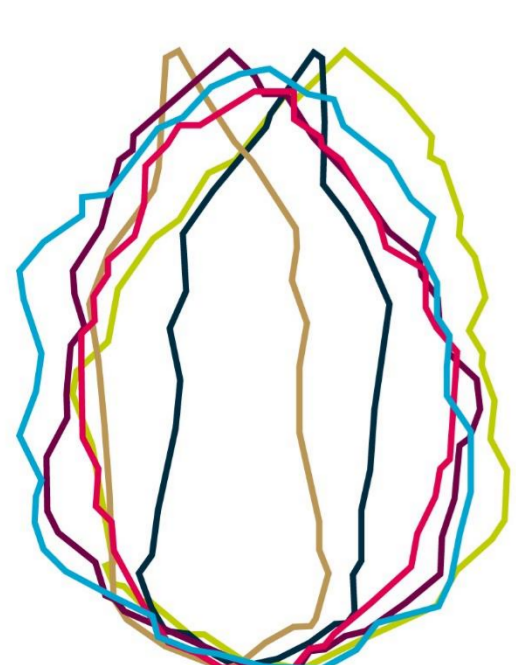
Figure 3. Metapodials used as soft hammers from the Schöningen 13II-4 Spear Horizon. Limited experiments show the specimen on the left, with a small detached bone flake, was used while relatively dry, and the specimen on the right, with an oblique fracture through the epiphysis, was used when fresh.

Conclusion

The tool-making bones from the Schöningen 13II-4 Spear Horizon are not the oldest example of such implements in the archaeological record, but, with nearly 100 specimens identified thus far, the assemblage represents the largest collection of tool-making bones dating from MIS 9 and earlier. Owing to the small lithic assemblage recovered at the site (~1500 fragments of chert), most of which consists of debris from retouching, it is likely that bone retouchers and soft hammers completely replaced stone hammers in the manufacture and maintenance of lithic tools used to butcher the numerous animal carcasses. The high variability in bone tool form and damage implies a variety of functional uses during different stages in the lithic reduction and resharpening sequence. Such diversity indicates the use of bones to shape lithic tools was a well-established behavior by MIS 9, with its origin well beyond 300,000 years ago.

References

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