Schöningen Tool-making Bones

Middle Pleistocene Bone Retouchers

The earliest bone and antler retouchers from Bourgogne (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., Cagney d’Espiguette, Le Méeouze, and Orgnac 3 in France, and Bolomor Cave, Cuerva del Ángel, and Grau Dolina in Spain) and in the Levant (Quseir Cave, Israel). These tool-making bones emerged at a time of broad technological upheaval, where the bifacial stone 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 7-5. 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 how 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.

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In total, 97 of the roughly 32,000 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 study. Consistent with the overhunting and utilization of horse (Equus ferus) 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 (Bovinae or Bovidae). Despite the prevalence 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 bunched areas consistent with use in a relatively fresh, just-fallen state, whereas others (n=12) show rough incisions and scalloped areas that indicate the use of comparatively dry bone in the manufacture of stone tools.

Nearly all retouchers, whether fresh or dry, include heavy, angular marks likely related to the removal of the patellarium or other adjoining tissue. 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 fissures, shallow cuts dispersed across the bone surface. This damage may be produced by pressing the thin edge of a lithic tool into the bone rather than敲击 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. Consciousness in the representation of limb bones is the relative lack of metapodials 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 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 cobble tools for butchery. 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 hacking 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. 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 150 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 butchery sequences. Such diversity indicates the use of bone to shape lithic tools was a well-established behavior by MIS 9, with its origin well beyond 300,000 years ago.