

Archaeology: Making an Impact

Two deer bones from the 120,000 year old Neanderthal site of Neumark-Nord 1 bear damage consistent with impact from a wooden spear. The hunting lesions are the earliest clear examples of such bone damage, and give clues to how Neanderthals hunted their prey.

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Archaeologically preserved “hunting lesions”--skeletal damage on prey resulting from weapon impacts--provide clear evidence that humans engaged in hunting. Writing in *Nature Ecology and Evolution*, Gaudzinski-Windheuser et al.¹ present the earliest unambiguous examples of hunting lesions, discovered in faunal collections from the 120,000 year old Neanderthal site of Neumark-Nord 1 in Germany. Their work demonstrates that Neanderthals hunted prey, and sheds light on their hunting strategies, such as the kinds of prey they exploited, whether throwing or thrusting was employed, and in what kinds of habitats they hunted.

Archaeological analysis of prehistoric hunting lesions has been going on for over four decades², and we now have some insight into what both healed and unhealed injuries caused by hunting weapons look like, where impacts were most likely to be lethal, and what kinds of weapons made what kind of lesions. More recent contributions have been made in relation to the Eurasian Upper Palaeolithic³, but in general progress on identifying lesions from earlier periods has stalled. This is partly because lesions occur rarely during hunting and preserve archaeologically even less often, but also because lack of an established methodology for assessing potential damage has made it difficult to clearly determine causality. As an example, a damaged scapula fragment of a butchered horse (Figure 1) from the 500,000 year old site of Boxgrove, in Britain, is one of the only proposed lesions from the entire Middle Pleistocene⁴, but it is difficult to definitively say that the semi-circular damage resulted from impact with a spear. Not only does the fragmented nature of the bone obscure the original shape of the damage, but other human and non-human activities could also similarly mark bone. There are ‘smoking gun’ examples from sites where portions of stone weapon tips remain embedded in the bone, for example from a 50,000 year old deposit at Umm el Tlel, Syria⁵, but the likelihood of wooden spear use preserving in this manner is slim, because as a material wood is highly vulnerable to decay.

Gaudzinski-Windheuser and colleagues’ re-analysis of fauna from Neumark-Nord, which was excavated in the 1980s and ‘90s, revealed perforated bones of two male fallow deer (*Dama dama geiselana*). One lesion is located on a pelvis and the other on a cervical vertebra. The size, shape and fracture characteristics of the perforations look to be well-matched to wooden spears of the kinds seen at Clacton-on-Sea in Britain and Schöningen in Germany

(Figure 1). Given that the spears at those sites are several hundred thousand years older than the Neumark-Nord site⁶, the discovery of hunting lesions from this period is not particularly surprising. What is unusual is the completeness of the perforations, making the forensic-style replication and analysis in this paper possible, with the demonstrated impact angles and wound channels particularly convincing.

Neanderthal hunting is typically depicted as being restricted to close-range strategies, based on proposed limitations of their weapons as well as of their physiology including an inability to throw⁷. Although the wooden spears made by Middle and early Late Pleistocene European *Homo* are generally agreed to be hunting weapons, they could also be tools for aggressively stealing carcasses from other predators. Therefore evidence that Neanderthals actively killed their prey directly contradicts the argument that their hunting weapons were not fit for purpose.

The work presents new approaches to studying both new and old faunal collections. The ballistics work is experimental archaeology at its best, connecting the physics of impact to fracture patterns of bone. The authors suggest that the lesions from Neumark-Nord support an interpretation of the complete Schöningen spears as thrusting weapons but although the angle of impact on the pelvis provides convincing evidence of thrusting, the vertebral lesion is less conclusive. The vertebral lesion is argued to result from thrusting on the basis of differences in impact energy between thrusting and throwing, but how energies compare and potentially overlap between these delivery methods is still being established experimentally. Energies and ability to penetrate vary on the basis of weapon material and design, the physiology and movement of prey in real hunting scenarios, and human performance.

It has been proposed that Neanderthals were not habitual throwers⁷, but palaeoanthropological research suggests the capacity for throwing was in place around 2 million years ago, well before Neanderthals evolved⁸. Furthermore, despite the portrayal of hand-thrown spears as short-distance weapons limited to 8 metres^{1,9}, the ethnographic literature has several examples of highly skilled throwers using spears accurately between 30 and 50 metres¹⁰⁻¹². Recent forager groups are documented as using spears as thrust and thrown weapons in tandem¹³, meaning their use is not mutually exclusive. If Neanderthals used *both* delivery systems, the hunting strategies available to them would have been diverse and flexible in terms of prey and landscape, placing less reliance on natural landscape features such as cul-de-sacs, and expanding focal prey species. Although the Neumark-Nord pelvic lesion convincingly demonstrates that Neanderthals used close-encounter spear thrusting as a tactic, it does not close the debate on Neanderthal throwing. If future work can focus on building a picture of how these weapons perform when thrown, we will be better able to understand whether early weapons and weapon users were optimised only for thrusting, or for throwing as well.

1. Gaudzinski-Windheuser, S. *et al.* Evidence for close-range hunting by Last

- Interglacial Neandertals. *Nature* 1–22 (2018).
2. Noe-Nygaard, N. Mesolithic Hunting in Denmark Illustrated by Bone Injuries Caused by Human Weapons. *Journal of Archaeological Science* **1**, 217–248 (1974).
 3. Duches, R. *et al.* Identification of Late Epigravettian hunting injuries: Descriptive and 3D analysis of experimental projectile impact marks on bone. *Journal of Archaeological Science* **66**, 88–102 (2016).
 4. Parfitt, S. A. & Roberts, M. B. Human modification of faunal remains. In *Boxgrove: A Middle Pleistocene hominid site at Eartham Quarry, Boxgrove, West Sussex* (eds. Roberts, M. B. & Parfitt, S. A.) **Archaeological Report 17**, 395–415 (English Heritage, 1999).
 5. Boëda, E., Geneste, J. & Griggo, C. A Levallois point embedded in the vertebra of (*Equus africanus*): hafting, projectiles and Mousterian hunting weapons. *Antiquity* **73**, 394–402 (1999).
 6. Thieme, H. Lower Palaeolithic hunting spears from Germany. *Nature* **385**, 807–810 (1997).
 7. Churchill, S. E. & Rhodes, J. A. The evolution of the human capacity for "Killing at a distance": the human fossil evidence for the evolution of projectile weaponry. In *The Evolution of Hominin Diets* (eds. Hublin, J.-J. & Richards, M. P.) 201–210 (Springer, 2009).
 8. Roach, N., Venkadesan, M., Rainbow, M. & Lieberman, D. Elastic energy storage in the shoulder and the evolution of high-speed throwing in Homo. *Nature* **498**, 483–487 (2013).
 9. Churchill, S. E. Weapon Technology, Prey Size Selection, and Hunting Methods in Modern Hunter-Gatherers: Implications for Hunting in the Palaeolithic and Mesolithic. *Archeological Papers of the American Anthropological Association* **4**, 11–24 (1993).
 10. Roth, H. L. *The aborigines of Tasmania*. (Kegan Paul, Trench, Trübner & Co, 1890).
 11. Christison, R. & Edge-Partington, J. 19. Notes on the Weapons of the Dalleburra Tribe, Queensland, Lately Presented to the British Museum by Mr. Robert Christison. *Man* **3**, 37 (1903).
 12. Meggitt, M. J. *Blood is their argument: Warfare Among the Mae Enga Tribesmen of the New Guinea Highlands*. (McGraw-Hill Humanities Social, 1977).
 13. Ellis, C. J. Factors Influencing the Use of Stone Projectile Tips: An Ethnographic Perspective. In *Projectile Technology* (ed. Knecht, H.) 37–74 (Plenum Press, 1997).