

# Ancient humans brought tools to Europe

Remains from Lebanon show that advanced technology was not a European invention.

Andrew Curry

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Marjolein Bosch/PNAS

Snails from the Ksar Akil site in Lebanon, where Upper Palaeolithic people removed their shell tops to help extract the flesh.

A collection of 44,000-year-old snail shells and the remains of two humans dubbed Egbert and Ethelruda might have settled an argument about the origins of tool use in Europe.

Analysis of these remains suggests that the advanced tool use that characterizes the period known as the Upper Palaeolithic, beginning around 50,000 years ago, was carried with the people who colonized Europe from Africa by way of the eastern Mediterranean region called the Levant. This contradicts an alternative theory that these people invented such tools after they settled in Europe.

Egbert and Ethelruda were part of a group of humans who used tools and body ornaments such as shells and teeth, which are similar to artefacts found at early European sites. They were unearthed from a site in Lebanon called Ksar Akil in the 1930s and 1940s. But dating human remains from Ksar Akil has been problematic because bones from the site are so degraded that they do not contain enough organic material to analyse using radiocarbon techniques.

Marjolein Bosch, a zooarchaeologist at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, analysed shells of a sea snail found along with the bones, called *Phorcus turbinatus*. This marine organism was commonly eaten by people living at the site and can be radiocarbon dated. Her work, published in the *Proceedings of the National Academy of Sciences*<sup>1</sup>, puts Ethelruda, the earliest-known modern human at Ksar Akil, there before 45,900 years ago.

“Our new radiocarbon dates are older than any modern-human remains in Europe, suggesting that, on their way out of Africa, these groups of humans came through the Levant and colonized Eurasia from there,” says Bosch.

This suggests that humans were already using relatively modern tools before they reached Europe. “Now we know there are modern humans with an Upper Palaeolithic toolkit in the Levant at this time,” Bosch says.

## Snail science

As well as radiocarbon dating, the researchers used a variety of other techniques to peg the earliest shells as 45,000 years old. For example, they correlated oxygen isotopes in the shells with water-temperature records from different times throughout the Palaeolithic.

Bosch’s results contradict the conclusions of a 2013 study published in *PLoS ONE*<sup>2</sup>, which used smaller, decorative shells to date the deepest and earliest layers of sediment at the site. That study concluded that Ksar Akil’s earliest inhabitants lived at the site closer to 40,000 years ago — after similar sites in Europe had already been settled.

One author of that study, archaeologist Katerina Douka of the University of Oxford, UK, says that the Lebanese site's 80-year-old excavation records and boxes of artefacts can be chaotic and confusing. Work at the site was interrupted twice by war, and the shells and other items used for dating passed through many hands before landing in a repository in the Netherlands.

Douka says that the evidence is not clear enough to support Bosch's conclusions — or, in retrospect, hers. "It's a difficult site to excavate, and we need to keep that in mind when we make these sweeping conclusions," Douka says. "We were wrong as well to explain things based on one site. A single site will not give you the answers to human migrations over large areas."

But archaeologist Paul Mellars at the University of Cambridge, UK, says that the multiple lines of evidence in the latest study are persuasive. He says that Bosch seems to have "developed a more rigorous way of selecting samples and purifying them than earlier methods". This is important because any contamination can radically alter dates in such studies. "Just a breath of contamination can clip 5,000 years off, easily," Mellars says.

Olaf Jöris, an archaeologist at the MONREPOS Archaeological Research Centre and Museum for Human Behavioural Evolution in Neuwied, Germany, adds, "What is clear is that, for the Initial Upper Palaeolithic, the oldest dates are older than Douka *et al.* The work is very well done and much more careful than in any other publication I've seen."

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## References

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1. Bosch, M. *et al.* *Proc. Natl Acad. Sci. USA* <http://dx.doi.org/10.1073/pnas.1501529112> (2015).
2. Douka, K., Bergman, C., Hedges, R., Wesselingh, F. & Higham, T. *PLoS ONE* **8**, e72931 (2013).