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Early modern humans in Africa used high-tech adhesives extracted from a local conifer

In the Middle Stone Age, early *Homo sapiens* in South Africa used glue made from local *Podocarpus* trees to attach stone tools to wooden spears. This glue has excellent adhesive properties and can only be produced in an elaborate process, according to scientists from the University of Cape Town (UCT) and the University of Tübingen, who mapped out the production in a study published in the latest edition of [*Proceedings of the National Academy of Sciences*](#).

The fact that early modern humans did not resort to more readily available adhesives some 100,000 years ago is a testament to their innovative abilities and skills. This may even have been a turning point in human cultural evolution.

Yellowwoods, conifers of the genus *Podocarpus*, are tropical evergreen shrubs and trees. "Adhesives have been discovered at several Middle Stone Age sites in South Africa, mostly as residues on scrapers or stone blades that had been glued to handles or spears," says Professor Edmund February from UCT's Department of Biological Sciences.

Chemical analysis had shown that such glue was often extracted from yellowwoods. "This is surprising because yellowwoods do not exude tree resins or any other sticky substance," February says.

The team investigated how the adhesive could be made when only Stone Age materials and tools were available. "The leaves of the yellowwoods contain small amounts of resin, which you have to distill out," February explains.

The team discovered two ways to manufacture the glue: "It's quite simple to burn the leaves directly next to flat stones. This leads to the condensation of tar, which can be scraped off the stones. This is a process that people may have discovered by accident," he says. The second option is more difficult and time consuming. In it, the leaves have to be

heated in a kind of underground distillery for several hours, so that the tar drips into a container. It is not known which method was used.

Either way, says February, it was astonishing that early modern humans at that time did not use any plants other than yellowwoods as sources of glue.

"People could have simply collected tree resin. In several species that occurred in their environment, it flows visibly from the trunk. And some plants release sticky latex when the leaves break off," says Tabea Koch from the University of Tübingen.

The team found the explanation with the help of standard laboratory tests, such as those used in the adhesives industry: "Our tar distilled from yellowwoods had particularly good mechanical properties and proved to be stronger than all other naturally occurring adhesive substances of the Stone Age in South Africa; it was able to hold significantly larger loads," says Dr Patrick Schmidt from the University of Tübingen.

The fact that modern humans in southern Africa purposefully produced particularly good adhesives around 100,000 years ago was a turning point in the development of our direct ancestors, Schmidt says. "People weren't selecting materials based on their properties, they were modifying the existing material. Such new engineering technology required higher cognitive abilities and innovative thinking."



The condensation method is a way of producing sticky tar from Podocarpus

leaves. In this process, the leaves are
burned next to smooth, flat stones.

Photo: Tabea Koch

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