Communication and Marketing Department
Isebe loThungelwano neNtengiso
Kommunikasie en Bemarkingsdepartement

Private Bag X3, Rondebosch 7701, South Africa
Welgelegen House, Chapel Road Extension, Rosebank, Cape Town
Tel: +27 (0) 21 650 5427/5428/5674 Fax: +27 (0) 21 650 5628

www.uct.ac.za

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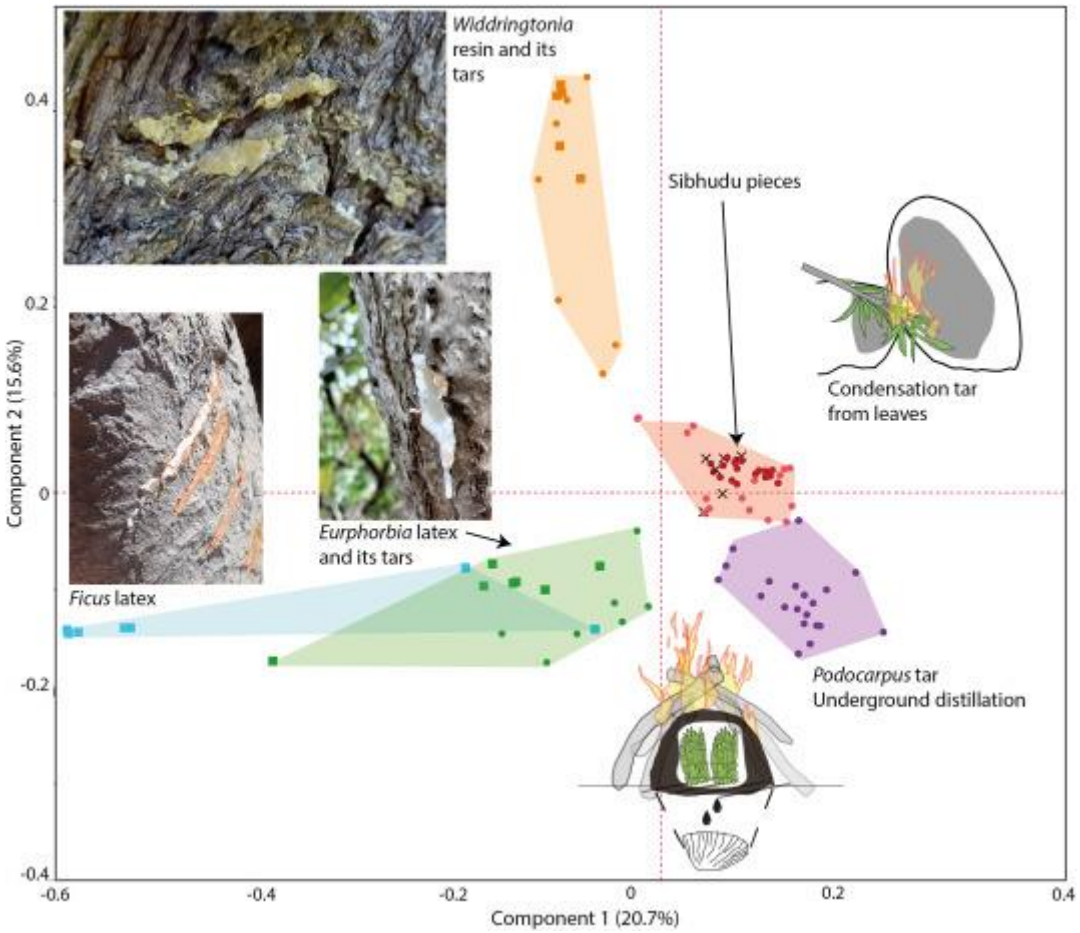
Research finds early modern humans in Africa made glue from the leaves of diverse plants



Results of the chemical analysis show that Sibhudu adhesives were produced using the condensation method, utilising various local plant leaves.

Researchers from the University of Cape Town (UCT) have found that in the Middle Stone Age, early *Homo sapiens* in South Africa used adhesive substances to attach stone tools to wooden handles and spears. Until now, it was thought that only trees of the genus *Podocarpus* were used to make these glues. This, on its own, is a spectacular finding,

according to UCT and University of Tübingen's Dr Patrick Schmidt, because *Podocarpus* conifers do not produce visible exudations of resin that could be used as adhesives.

"Instead, glues must be distilled from the leaves of these plants. There are several distillation processes with which this can be done; some are complicated and laborious to perform, others straightforward. Which of these processes was actually used remains unknown," said Dr Schmidt.

Titled "Adhesive technology based on biomass tar documents engineering capabilities in the African Middle Stone Age", the findings were published in a peer-reviewed journal, *Journal of Human Evolution*.

In their study, the researchers analysed remains of adhesive substances on stone tools from the South African Middle Stone Age site Sibhudu Cave in KwaZulu-Natal. To understand the methods by which these adhesives were made, they built a large experimental reference collection of adhesive substances made from different plants and with different techniques.

"These reference samples were analysed chemically, and their composition was compared with the archaeological sequences," explained Armelle Charrié-Duhaut from Strasbourg University, who co-authored the study.

An unexpected finding

When comparing the chemical compositions of these artefacts with those of experimental substances, the researchers found that they were most likely made with a technique called the condensation method. In this process, leaves are burned beside flat stone surfaces, and a tarry substance condenses onto the surface from the fumes emitted by the leaves. It turns out that this technique is the most time-efficient way of making such adhesives from leaves. "What surprised us, however, was that these tars did not contain specific markers of *Podocarpus*," said Charrié-Duhaut.

Edmund February, an Emeritus Associate Professor in UCT's Department of Biological Sciences, added: "We therefore began experimenting with the leaves of other plants present in the environment of Sibhudu Cave."

And indeed, it is possible to make tar from the leaves of many local plants. The chemical processes are similar to those taking place in modern biogasification plants. "We realised that these adhesives are actually better called biomass tars instead of *Podocarpus* tars. *Podocarpus* was likely only one of the many plants used for making these tars," Schmidt explained.

According to the researchers, the findings open up new avenues for Middle Stone Age research by overcoming the often repeated tenet that Middle Stone Age additives were exclusively made from *Podocarus*. They added that the findings also show that the foragers of this period had an intimate knowledge of transformative processes and their natural environment.

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Issued by: UCT Communication and Marketing Department

Ridovhona Mbulaheni

Media Liaison and Monitoring Officer
Communication and Marketing Department
University of Cape Town
Rondebosch
Tel: (021) 650 2333
Cell: (064) 905 3807
Email: ridovhona.mbulaheni@uct.ac.za
Website: www.uct.ac.za