

A new Palaeolithic discovery: tar-hafted stone tools in a European Mid-Pleistocene bone-bearing bed

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Abstract

Two stone flakes partly covered in birch-bark-tar and a third without tar on it were discovered in fluvial gravel and clay in central Italy, in association with the bones of a young adult female *Elephas (Palaeoloxodon) antiquus* and several micromammals. The probable chronology of the stone flakes is compatible with the late Middle Pleistocene suggested by the site's small mammals and geological context. The fauna indicates a cool stadial episode before isotope stage 6. That age means the flakes are the oldest ever found hafted with tar and indicate a greater capacity for late Middle Pleistocene hominins to utilize raw materials available during cold phases.

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1. Introduction

Elephant and rodent remains were exposed in November 2001 in a clay pit, Campitello Quarry, in the outskirts of Bucine, a small village in the southern part of the Upper Valdarno basin, on the left hydrographic side of the Arno River (Fig. 1). The

bones were entombed in fluvial gravels and sands stratigraphically dated to the Middle Pleistocene. A more clear-cut chronological indication is given by the rodents which prove that the finds date back to a moment of the late Middle Pleistocene.

Middle-Late Pleistocene fossil mammalian remains have been known for a long time from this area and the nearby Ambrabra river; a new elephant was not a surprise. Three lithic implements were also found amongst the bones (Figs. 2, 3), one of which is hafted with a blackish organic material. A second flake has patches of similar material on it. These are the first hafted lithic items brought to light in the area; their stratigraphic position also makes them the oldest hafted specimens known anywhere. They were the first hafted lithic tools ever found in the area; not only, their stratigraphic location also made them

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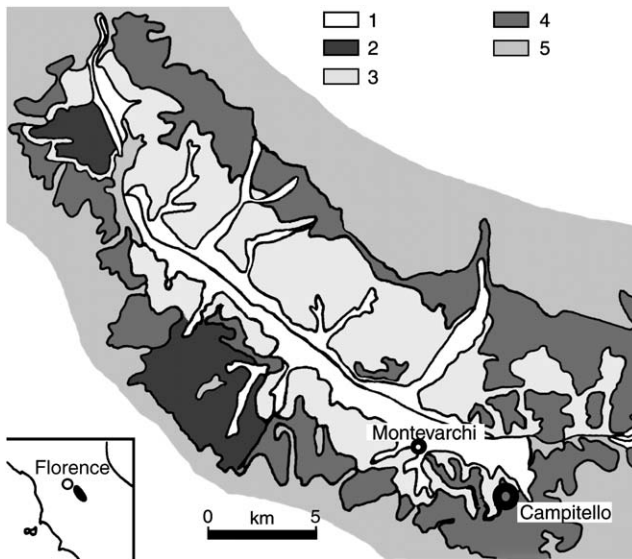


Fig. 1. Simplified geological map of the Upper Valdarno Basin. The map shows: (1) recent and terraced alluviums; (2) Middle Pliocene fluvio-lacustrine sediments; (3) Upper Pliocene-Lower Pleistocene fluvial sediments; (4) Middle-Upper Pleistocene sediments; (5) bedrock.

the oldest hafted tools ever known. This discovery, of extreme scientific importance, provides us with a great deal of invaluable information on man's most early hafting techniques.

The lithic artefacts are stored in the Section of Geology and Palaeontology of the Museum of Natural History of Florence,

the elephant bones in the Palaeontological Museum of Montevarchi, and the rodent material at the Department of Earth Sciences of the University of Florence.

2. Geological context

The Upper Valdarno Basin is a vast extensional depression which was formed during differential uplift of the Northern Apennine chain [26]. The graben is filled with over 550 m of Plio-Pleistocene alluvial and paludal/lacustrine deposits that have been divided into three sedimentary units, corresponding to three main phases of deposition [2]. The Campitello sample was found in fluvial sediments of the third phase called Monticello Succession [1,2,25] (Fig. 4). This unit, which lies unconformably separated by a major erosive surface over the Upper Pliocene-Lower Pleistocene lacustrine/paludal and alluvial fan sediments of the second phase called Montevarchi Succession, consists, from the base upwards, of 30–50 m of coarse-grained gravel, medium- to coarse-grained sand [9], and extensively pedogenized silty clay with sand interbeds. The Monticello Succession is palaeomagnetically and palaeontologically dated to the Lower-Middle Pleistocene [6,28]. Palaeocurrent evidence indicates a ESE source area, with several cycles of fluvial deposition referred to the Palaeo-Arno river [8].

By the second half of the Middle Pleistocene the tectonic movements in the basin caused a downcutting of the Arno

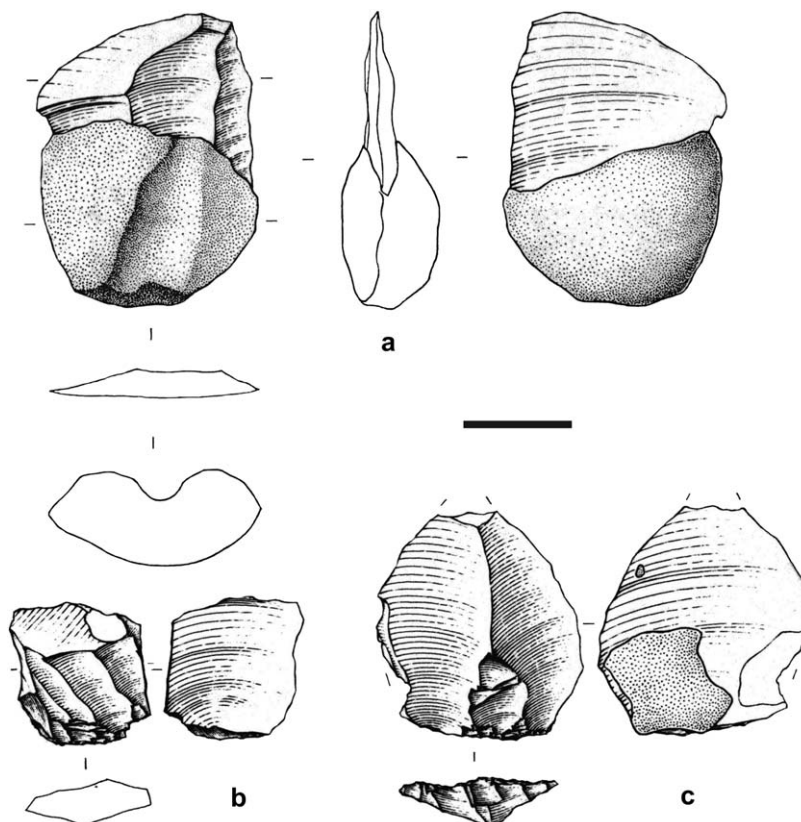


Fig. 2. Lithic artefacts from Campitello (drafts by L. Baglioni): (a) flake 3; (b) flake 2; (c) flake 1. Scale bar 2 cm.

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