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BREAD FOR THE GODS: MACRO AND MICROSCOPICAL ANALYSES OF BREAD FRAGMENTS FROM A RELIGIOUS CONTEXT IN SOUTHEASTERN ITALY

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INTRODUCTION

The archaeological and archaeobotanical investigations in a cultural context (sanctuary) at Oria (Brindisi, Italy) revealed a lot of botanical remains that allow us to decoding the exploitation of vegetal resources used in the bread process. So the recovery of some fragments of dough has made necessary to set an experimental method to understand which were the raw materials used.

CONTEXT OF STUDY

Oria is one of the most important indigenous site of Messapia placed in the south of Puglia region. The sanctuary of Oria, Monte Papalucio (VI-III cent. B.C.) is dedicated to Demetra e Persefone. The investigations in the sanctuary have brought to the recovery of a lot of botanical charred remains interpretable as votive offered.

Fig. 1-2: localization of archaeological site and its illustrated design

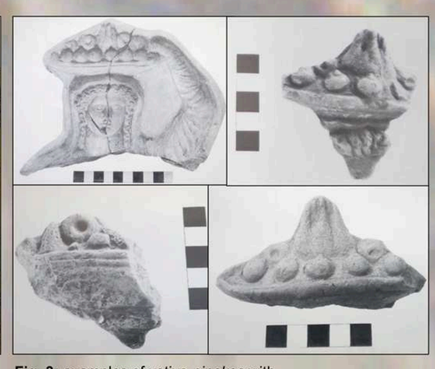


Fig. 3: examples of votive *pinakes* with representation of fruits and doughs

Besides the numerous charred seeds/fruits (*Vicia faba*, *Hordeum*, *Triticum*) and tree fruits (fig trees, pomegranates, grapes, olives) recovered, dough and doughnut have also been brought to the light. Different typologies of doughnut are been recovered: some decorated with grape pips, others with figs or caryopses. These doughs are probably linked not only to the feeding but more tightly to the cult of Demetra and Persefone.

Fig 4: actual preparation of doughnut

Fig. 5: Archaeological doughnut from Oria

Fig. 6: Doughs from Oria

ARCHAEOBOTANICAL ANALYSIS

The main shape of dough is like a doughnut, but it is possible distinguish flat bread too.
In order to understand if doughs are raised or not an experimental protocol has been set. The dough and leavened dough were reproduced and after cooking, they were charred at different temperatures. In this way it was possible to individualize a lot of vacuums linked to the process of leavening.

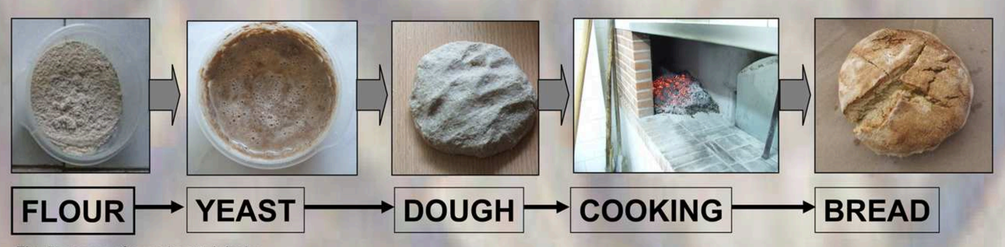
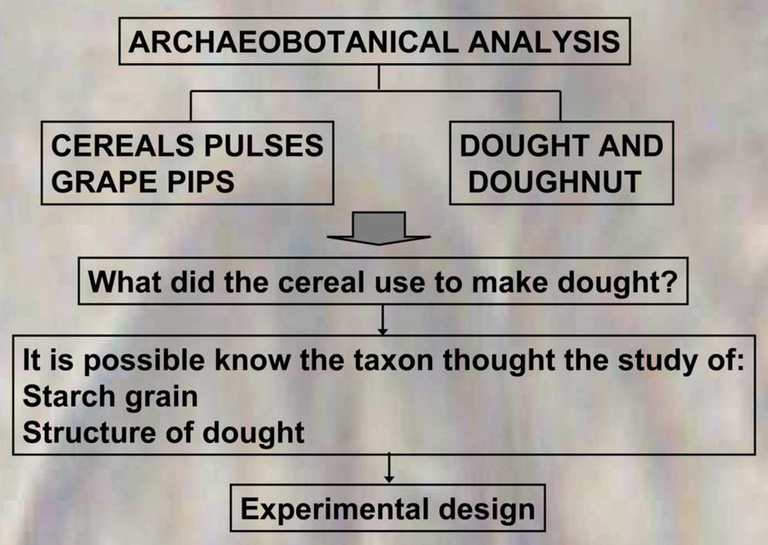


Fig. 7: stages of experimental design

Fig. 8: Preparation of sample

Fig. 9: Bread fragments burned at different temperature



The experimental design has been conducted on cereals, legumes and tree fruits, dough to the purpose of observe the presence of the starch and its transformation in the different phases and to understand if starch grains can be a marker to individualize the seed species used.
A collection of reference of modern raw materials has been created that shows as the starch grains are strongly degraded, and therefore not visible, in the charred material: so we have to find another marker.

Fig. 10: Starch grains of *Triticum* sp., *Hordeum* sp. and *Secale cereale* in the flour

Fig. 11: Protein morphology changing

Fig. 12: Degradation of starch grains subject to boiling

Samples of dough were observed through an ESEM (Environmental Scanning Electron Microscope) in order to studying their morphology. Thus it was possible to observe as the outer surface appears compacted and smooth due to the action of rolling. Instead, the inner structure seems particularly rich in vacuums.

Fig. 11: Morphological analysis of archaeological doughnut by ESEM that show the compacted and smooth surface and vacuums

RESULTS

The experimental results and the ESEM (environmental scanning electron microscope) analysis performed on the votive offers of Oria suggest choosing a marker such as the morphology of dough in order to understand the raw materials used. The density of vacuum in the microstructure appears connected to glutin percentage, as we can see on modern examples. Probably the taxon used to make our doughnut is a cereal with an high percent of gluten, such as a naked wheat.

Meirano V. 1996: Frutti, dolci e focacce in area metapontina: la documentazione coroplastica, Bollettino Storico della Basilicata,12: 67-102. Ciaraldi M. 1997: Oria, Monte Papalucio: i resti vegetali delle offerte di età arcaica ed ellenistica, In F. D'Andria (a cura di), Metodologie di catalogazione dei beni archeologici. Beni Archeologici-Conoscenza e Tecnologie, Quaderno 1.1 CNR, Università degli Studi di Lecce: 211-228. Meirano V. 2000: Mets et végétaux en Grande Grèce: nouvelles données de la coroplathie, in Luce J.M. (ed.), Actes de la Table Ronde Internationale, Paysage et alimentation dans le monde grec. Les innovations du premier millénaire av. J.C., Université de Toulouse-Le Mirail (Toulouse 1998), Pallas Revue des études antiques, 52: 167-180. Fiorentino G. 2008: Paleoambiente e aspetti rituali in un insediamento archeologico fra fase arcaica ed ellenistica: nuove analisi archeobotaniche ad Oria-Papalucio (BR), in F. D'Andria, J. DE Grossi Mazzorin, G. Fiorentino (a cura di), Uomini, piante e animali nella dimensione del sacro, Beni Archeologici-Conoscenza e Tecnologie, Quaderno 6, CNR, Università del Salento: 97-110. Amanda G. Henry, Holly F. Hudson, Dolores R. Piperno, 2009: Changes in starch grain morphologies from cooking, Journal of Archaeological Science 36: 915–922.