

Be-Archaeo archaeometric investigations

In the framework of the Be-Archaeo project many different scientific investigations have been carried out to try to answer specific questions related to archaeological sites and finds, obtaining many and interesting results. The work done by Be-Archaeo archaeometric team focused on the analysis of different places, materials and samples: starting from the Tobiotsuka Kofun, its structure have been investigated and both its soil, plants and microbiological community have been analysed; moreover, archaeological finds made by inorganic materials such as pottery, glass and metals found both in the Tobiotsuka Kofun and other archaeological sites have been studied. This has been done by a set of procedures, including invasive (i.e. with sampling) and non-invasive (i.e. without sampling) techniques in order to characterize the raw materials employed, to investigate provenances and dating and to disclose the technical procedures used to produce the ancient manufactures. Both Japanese and European laboratories and institutions have been involved in these analyses. Occasionally the researchers had to be present on site during the archaeological excavation, to carry out their acquisitions or to collect their samples. For the analysis, in some cases suitable instrumentations were available at the Okayama University or by the laboratories of the Shimane Prefecture Board of Education. In some other cases, portable equipment has been moved from Europe to Japan, while in other cases the necessity to use protocols or procedures set up and tested in the European laboratories, required to move the samples far away from their home, in Italy.

Among artefacts that are crucial to Yayoi and Kofun burial practices, glass beads from different collections and archaeological sites have been analysed (Fig. 1) in order to recognize the glass type, colourants, opacifiers and production techniques used by Yayoi and Kofun societies. The information obtained by means of different analytical techniques, connected with previous scientific studies on this topic, clarified provenance and highlighted trade routes of imported glass beads during the Yayoi and Kofun periods.

As for pottery, another main part of funerary items, different archaeometric questions and issues arise during the project and many approaches have been employed to answer. One question was about the presence of potteries made from different clays in the same burial site: clays texture and composition were scrutinized with a bunch of instrumental approaches (Fig. 2): starting from the 3D models of the external part through the photogrammetric acquisitions and the internal part through X-ray tomography, passing through the petrographic examination, the determination of elemental composition, up to archaeomagnetic investigations and thermoluminescence dating. Sherds of pottery pedestals found on the Tatetsuki mound (Kurashiki City, Okayama prefecture) and a set of ceramic fragments from archaeological sites in the Shimane prefecture, namely Ueno, Zanmochi and Ishidai, were analysed disclosing common features and highlighting differences in the structure and composition of the pottery clay. Some features of the pottery were linked to the outcrop of different soils where clays may have been explored, therefore highlighting, from a material point of view, the groups that can be recognized, giving a further support to the archaeologists to the interpretation of typological features of the artefacts.

Also metals finds have been considered in the archaeometric investigations: mainly finds from the Tobiotsuka kofun excavated during the Be-Archaeo project have been analysed and compared with other materials from contemporary kofuns, with the main objectives to recognize the typology of object, the composition, its state of preservation and the presence of alterations due to the long burial of the pieces. For these reasons both imaging, elemental and phase techniques have been employed, allowing, as an example, to recognize some iron nails corroded due to the burial conditions of the artefact.

Another goal of the Be-Archaeo project, that is strictly related to the scientific analyses in the lab even if it starts from the very beginning of the archaeological excavation, is the correct conservation of archaeological findings both to avoid risk for the artefact conservation itself and to avoid the risk to influence or disguise the results of analyses. Suitable material shall be used to pack the archaeological finds, and conservation

treatments shall foresee possible archaeometric investigation on the manufacture, in order not to prevent the possibility to gain information through the scientific investigation.

All the data and results obtained in the scientific investigation of the archaeological finds are uploaded in the Be-Archaeo open database that is freely available online for anyone interested in studying these materials and knowing more about Ancient Japan and all the scientific methodologies now available to study past societies and their developments.

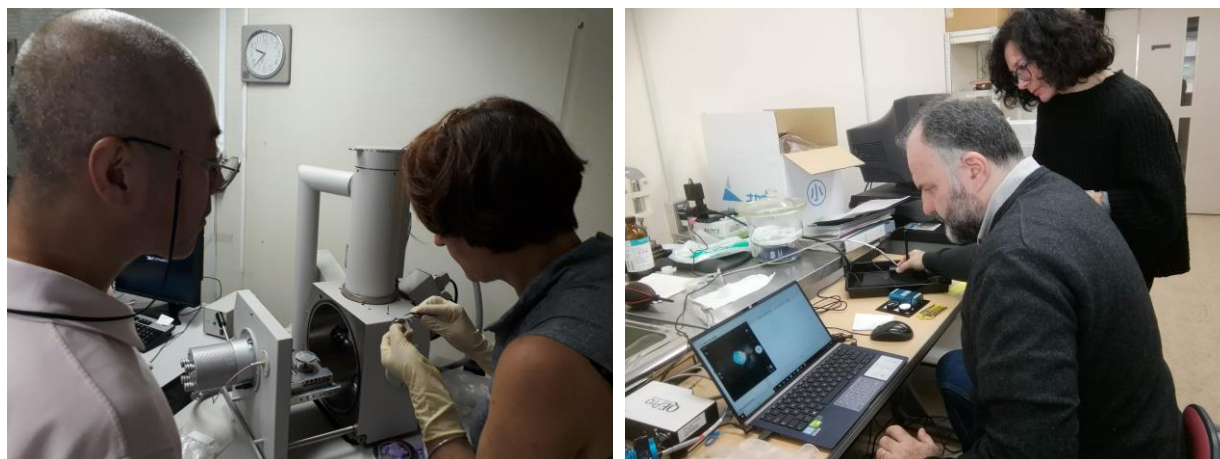


Figure 1: Japanese and European researchers analysing glass beads by SEM (Scanning Electron Microscope, on the left) and FORS (Fiber Optic Reflectance Spectroscopy, on the right).



Figure 2: The analysis of pottery has been carried out both at the University of Okayama in Japan (e.g. polarized optical microscopy, on the left) and at the university of Torino in Italy (e.g. ICP-OES, Induced Couple Plasma Optical Emission Spectroscopy, on the right).