1. Background of the project

In spite of its provincial status, at the periphery of Mediterranean world, during the Hellenistic period the East Adriatic coast, especially Central Dalmatia in South Croatia was engaged in intensive trade with the Mediterranean Hellenistic world. The process of the Hellenization of the East Adriatic began in the early 4th c. BC with the establishment of the Greek colonies Pharaos on the island of Hvar and Issa on the island of Vis, having as a result an increase in import of the Hellenistic goods. The most imported goods were ceramic vessels from various centres of production in southern Italy and mainland Greece. There is no doubt that the established colonies Issa and Pharaos imported and distributed Hellenistic goods to the indigenous communities in the hinterland of the eastern Adriatic.

The Greek settlement Issa shortly after its establishment began an independent political life and economy based on the wine production. The large quantities of amphorae were found on the island, around the fertile fields and the fragments of poorly fired amphorae were found near the eastern town walls were parts of kiln were found. That indicates that Issa produced amphorae – containers for the wine export.

In the mid-3rd c. BC, under the strong influence from the southern Italy, especially from the ceramic workshops in Apulia, today Puglia, Issa started the production of fine table ware – Gnathia ware. The results of the comparative stylistic analysis of 200 Gnathia vessels from Issa have shown that Issaean potters were under the influences not only from the Apulia, but from the workshops on mainland Greece as well. In tracing potters activity in Issa the preliminary archaeometric analysis on imported and local Issaean Gnathia vessels were conducted. These results have confirmed archaeological assumptions that Issa produced fine table ware and amphorae during the Hellenistic period.

The strong economic uprising during the 3rd c. BC allowed Issa to expand its territory along the neighbouring Dalmatian coast – it is believed that Issa made some kind of political alliance with the indigenous communities in Tragurion (today Trogir near Split) and Epetion (today Stobreč, east suburb of Split). The preliminary stylistic analyses of fine pottery from Trogir and Stobreč have shown that the Issaean Gnathia ware was exported to these two settlements. Unfortunately, the stylistic analysis disables us to confirm whether Tragurion and Epetion imported other ceramic products like kitchenware and other table ware from Issa, and whether they established their own production of vessels for everyday use.
During the Hellenistic period, in Resnik in the Kaštel obala, a harbour was established, probably for the Issaean trade with the indigenous communities in the hinterland of the Central Dalmatia. The preliminary stylistic analyses on fine pottery from Resnik have showed that the ceramic material from this site is different from the Issaean. These analyses together with the preliminary results of the archaeometric analysis indicate a local workshop in Resnik.

In Pharos, other Greek colony in the Central Dalmatia, remains of the potter kiln were found near the northern town walls, and during the recent excavations, the fragment of poorly fired kitchen ware were found within the residential complex. Furthermore, the preliminary archaeological analyses indicate local production of fine table vessels. However, the archaeometric analyses were not conducted to confirm these archaeological assumptions.

During the Hellenistic period the Central Dalmatia was enrolled in vivid Mediterranean trade, but not only as receiver of everything that comes from the larger centres, but also as a the instigator of social and economic changes that have affected not only the lives of the settled Greeks but also of the indigenous communities in this area. Therefore, the ceramic studies – the analysis of the vessels that were used in daily life and its process of production, consummation and distribution can provide answers to many archaeological and historical questions, leading to a great potential for the archaeometric research.

2. Research objectives and expected results

Archaeometry or archaeological science among the scholars in Croatia is relatively new and unexplored field of research. The descriptive analyses of vessels were and still are the only method of analysing. They are based on the comparative analysis of the decorations and the shapes of the vessels. Although, some data about the ceramic workshop(s) can be obtain with these analyses, such as characteristics of the decorations and shapes, still with this descriptive approach we can only assume the provenance of the vessels and the existence of the workshop(s). The major obstacles of these archaeological methods are preservation of the ceramic material, the decorations on the vessel and/or its absence. On the other hand, the analysis of the shape can provide good insight into the production of certain types of vessels, but they have to be conducted on all ceramic assemblage, which we often lack – due to complexity of the archaeological excavations and archaeological context.

The objectives of the research are to determine potters workshop(s) in the Central Dalmatia during the Hellenistic period. The starting points for the research are the results of archaeological analysis and the preliminary archaeometric analysis of the fine table ware from Issa and of the raw material collected from the island of Vis. The aim is to continue with these analysis, but on a large number of samples from Issa, and to include samples of potsherd from Pharos and raw material from the island of Hvar: to identify the ceramic production and to identify what type of ware were produced, how they were produced and were they were distributed. That is why we included into our analyses the potsherds from Resnik; to confirm or disprove the existence of the ceramic workshop and to identify wheatear the imported vessels came from the workshop in Issa and/or Pharos. This approach combines the archaeological and archaeometric method of research and allows us
to reconstruct potters activities, from gathering of the raw materials, manufacturing: modelling, decorating and firing, and distribution. Also, analysing the potsherds that are assumed by archaeological analysis to be an imports and comparing them with the results of analysis conducted on the potsherds from South Italy, Albania and Greece can help us to determine the provenience of the vessels. The results can greatly contributed to our knowledge of the cultural exchange in the ancient times, and tracing the commercial networks in the Adriatic and beyond.

The collected results will be presented in a database with the information about the workshop(s): the geographic position, the types/shapes of ware that were produced, the chemical and mineralogical compositions, and their distribution.

The goal of the research is to connect archaeology and archaeometry in the Hellenistic ceramic studies and to improve our knowledge of ancient crafts on the East Adriatic coast. This will be the first such research conducted on both Greek settlements and also on the most prominent archaeological sites in the Central Dalmatia. If we take into the consideration the wider context of the project and its scientific contribution, the interdisciplinary approach and the collected results will lead to better understanding of the ancient material culture through natural science - archaeometry; identifying the craft specialisation and ancient technologies, and anthropological approaches can provide insight into the socio-economic and political interactions between the Adriatic communities following the networks of the technological transfer and social change.

3. Methodology and approach

Within the research the following archaeological and archaeometric methods will be applied:

1) Filed work - a geological and archaeological field survey on the islands of Hvar and Vis, mapping and sampling the raw materials; clay and temper, and sampling the potsherd from Issa (Vis), Pharos (Hvar) and Resnik. The field work will be conducted in the collaboration with the Archaeological Museum in Split - Archaeological Collection Issa, the City Museum Stari Grad on the island of Hvar and the City Museum Kaštela near Resnik.

2) Archaeological analysis - a comparative stylistic and typological analysis of the collected potsherds. All sampled potsherds will be described according to the type/shape/decoration and analogies in the catalogue with photos.

3) Archaeometric analysis - a lab analysis (the instrumental analytical research) of collected potsherds and samples of the raw material that will include: X-ray diffraction (XRD), X-ray florescence, ceramic petrography, scanning electron microscopy (SEM), and electron microprobe analysis (EMPA). The lab analysis will be conducted at the Department of Geosciences, University of Fribourg.

4) Interpretation of the results.

5) Creating database of all data obtained in archaeological and archaeometric analysis. This part of the project, as well as presentation of the result and publication, will be conducted at the Faculty of Humanities and Social Sciences in Split.
4. Research significance and innovation

All data obtained and recorded with the archaeometric analysis together with its contextual information from the archaeological sites will be placed in database and given to the disposal for all scientists (archaeologists, geologists, ethnologist and ethno-archaeologist) studying the ancient ceramic production in the Central Dalmatia.

The database will be presented on the web site of the project that will be created during the third year of the project. The easy access to the database will help other scientist to implement it in their researches of the Hellenistic ware in the Central Dalmatia and the Adriatic.

5. Host institution’s expertise in the field of the proposed project

The group “Archaeometry” is part of the Earth Sciences Unit of the Department of Geoscience at the Sciences Faculty of the University of Fribourg. The University of Fribourg is the hosting institution and will provide the necessary administrative support to the project. The project will be completed inside the Archaeometry Unit, under the supervision of Prof. V. Serneels. The Department of Geosciences will provide adequate working space and infrastructures: office, access to laboratory facilities (including samples preparation and measurements) and basic training in laboratory practices. There will also provide the access to the specialized library and internet.

At the [University of Fribourg, Switzerland](http://www.unifr.ch), we are committed to excellence in research and teaching and we take pride in our truly interdisciplinary spirit. We continue to further develop our international focus and above all we put humanity at the centre of our endeavours. We are Switzerland’s only bilingual university, offering a full academic curriculum both in French and German. A number of Master programmes are taught in English and the University offers a wide range of opportunities for PhD and doctoral studies as well as international Exchange and Summer School Programmes. The University of Fribourg places scientific research that is closely linked to academic teaching at the heart of its activities. With an array of centres of scientific excellence as well as research programmes across the entire disciplinary spectrum, we aim to extend the frontiers of scientific knowledge to help solve mankind’s current and future challenges.

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Archaeometry is the field of applied natural sciences to archaeological questions. The unit is focusing on the characterization of minerals materials used by man in the past like stones, ceramics, metals and glasses. The data obtained are used to solve issues on provenance of the raw materials or on production technologies. In Fribourg, this field of research has been established 30 years ago by prof. M. Maggetti and much experience has been accumulated. The group is now about 10 people, under the supervision of Prof. V. Serneels. The laboratory facilities available are X-ray fluorescence (XRF – Geochemistry), X-ray diffraction (XRD –...
Mineralogy) and optical and electronical microscopy (SEM). There are also facilities for experimental firing of clays. The specialized library is very large. The project fit perfectly the expertise of the unit and can be completed using its analytical facilities.

International collaboration is very welcome and the project can be the starting point for long term collaboration.

6. Work-in-progress...

Filed work:
Lab work:
7. Bibliography for the project proposal:

2. B. Čargo, M. Miše, Pottery production in Issa, Vjesnik za arheologiju i povijest dalmatinsku 103, Split 2010, 7-40.


