



From left to right: Necklace made of glass paste, Capena, 8th century BC, Museo di Villa Giulia; Fibula with glass paste coating, Falerii, VIIIth c. BC, Museo di Villa Giulia; Vagus made of glass paste, Cerveteri, VIIIth century BC, Museo di Villa Giulia.

## TIME-TRAVELLING CHEMICAL INVESTIGATIONS: THE MYSTERY SURROUNDING ETRUSCAN GLASS

Glass is an interesting material, even more so when it comes to the ancient examples of it. This story blends archaeology, material science, conservation and geology. It shows a not well known perspective on ancient artifacts, proposing to look at them from the material point of view. All the above said can be put into literally two words - archaeometry of glass.

This story begins in the Great Deserts of Egypt. Or on the beaches of Levant. Or on the bank or the mighty river of Euphrates. It does not matter now. What matters is that this story begins with sand. Pliny the Elder is telling the story on how some merchants have left some natron stones in the cooking fire resulting in the sand beneath the fire to melt and form the first man made glass to the great amusement of the said merchants. Modern scientists always smile hearing this story but it continues to be told from book to book. By the time of the Iron Age glass was apparently a well known material shaped in many useful or just pretty things. It could be differently colored and traveled great distances.

Three thousand years later I made the proposal to study glasses from the Etruscan archaeological contexts with some scientific methods. Ancient objects can still bear information needed to unlock mysteries of the past. The trick is to “ask” them in the right way. It is an interesting work that people do to answer various archaeological questions. The essence of my work with Etruscan material is studying the chemical composition of the artifacts in order to make suggestions on technology and provenance of ancient glasses. Why are studies of Etruscan glasses so important? Because Etruscan civilization occupied an important place on the

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trade map of the Mediterranean in the Iron Age. Being crafty and well learned in metallurgy these people had all the prerequisites to start making their own glass, yet no conclusive evidence of such production has been found so far.

My research has two main directions - technology questions and primary glass provenance. The former one tackles such questions as how the final color was achieved, what did they use to obtain opaque glasses, how did they shape the objects, what was the furnace temperature, etc. The latter one, and it is much more complicated, aims to answer the question of where those pieces were made. I do that by checking the output of the analytical equipment that is able to provide chemical data. Usually they involve some kind of radiation that is generated by one part of the apparatus and is directed at the sample. After this a somehow changed radiation returns back to the apparatus where it is transformed and presented as a spectral information. Lastly the skilled researcher can interpret this information based on the knowledge of the context of the material and profound knowledge of the material science. The work always reminds me of the popular US TV show, called "Crime Scene Investigation" or "CSI". I do not investigate crime scenes, but every piece of archaeological material given a proper study can help you to solve the crime and give an insight into the everyday life of ancient people, their technological capabilities and achievements. At the moment I work with several museums among which there are Museo Nazionale Etrusco di Villa Giulia and Museo Preistorico Etnografico "Luigi Pigorini" in Rome.

Studies of ancient glass are so deliciously complicated! As a material, glass takes a very special place due to its structure and the process of making it. It is a mixture of different raw materials that can originate from different places, it could be recycled in the past, its surface decay may complicate the studies, there are so many combinations of factors that influence the final appearance, it is almost impossible to date it precisely etc. All this makes it my favourite material for studying and interpretation. I wait for the results of this study like a child can't wait for Christmas!

I also hope that my excitement will be shared by the museums that will receive additional attribution of their objects, by archaeologists who will have more solid information for building their conclusions and by the general public that will have a chance to discover glass from a different perspective.