



# Studying chemistry with Pliny the Elder



The preparation of Telinum, the perfume of Julius Caesar and much more!

- INVOLVED DISCIPLINES:** history, latin, chemistry, biology; the project could also be extended to include physics and natural sciences such as geology
- KEYWORDS:** chemistry, history, ancient perfumes, Pliny the Elder, Naturalis Historia, bioluminescence, indigo, glass
- AGE GROUP:** 13–18 years (depending on your specific goals)
- MATERIALS:** spices, essences, olive oil, woad leaves, ammonia, boric acid, lead(II) oxide, zinc oxide, copper(II) oxide, cobalt(II) oxide, manganese(IV) oxide, chromium(III) oxide, luminol, sodium oxide, potassium hexacyanoferrate(III), hydrogen peroxyde, lab glassware, crucible and Bunsen burner
- PROJECT HEAD:** Gianluca Farusi
- INSTITUTION:** Istituto Tecnico Industriale Galileo Galilei, Carrara, Italy

## SPECIAL CHARACTERISTICS OF THE PROJECT

The students start from the same pre-scientific position as the author and that results in a strong motivation; e. g. the preparation of Telinum, the perfume of Julius Caesar, is a surefire way in order to get even the laziest student to be curious about separation methods.



## CONCEPT/OBJECTIVE

The project moves through some of Pliny the Elder's doubts and statements which have been subdivided into lessons. Each lesson begins with a selected passage of the "Naturalis Historia" the context from which the learning process starts. Step by step, as a consequence of an interplay between teacher and students, a tree structure set of demonstrations takes shape and its purpose is to build a concept map whose target consists in reaching the first year chemistry course goals. The passage from "Naturalis Historia" is reviewed in the classroom and then the class moves on, recreating in the lab either the same natural event the author refers to, or something similar.

## PROJECT DESCRIPTION

As the phrase goes, if you want to teach a child how to swim, the first thing to do is to get him to dive into the sea. In fact you might even be the best swimming instructor in the world, yet if you do not succeed in motivating a child to swim, all your good intentions are thwarted. I think that the adventurous and archaeological contexts such as voyages of exploration





or archaeological finds, are really motivating as far as science teaching is concerned, and this project is evidence of that. The subjects and the demonstrations of the project that the students liked best were: the preparation of some perfumes from the roman and greek world, the preparation of glass, indigo extraction and indigo dyeing and bioluminescence. Before preparing the perfumes students were recommended to read the short essay I had written, concerning the use and manufacture of perfumes in the ancient world. Besides "Naturalis Historia" the books referred to, are: "De materia medica" and "De odoribus". The almost qualitative "recipes" were revised from the quantitative point of view, so that they could fit the lab demonstrations. Likewise for glass: after a short essay concerning ancient glass and its physical chemical aspects, students went on to make it. They replaced silica



with boric acid so that, at a relatively low temperature, they could prepare vitreous paste that could be worked to obtain tesserae. The same outlines were followed to work with indigo and bioluminescence. As far as indigo is concerned I strictly and continuously connected the archaeological aspects with the chemistry linked to them. When bioluminescence was approached a challenging competition started: students discussed together, trying to work out the animal or vegetable species Pliny referred to when he described a bioluminescent event. They also asked themselves which environmental reason made bioluminescence a resource for a certain species. Chemical and biochemical aspects were also discussed.

» 2011 is the International Year of Chemistry and this work aims at celebrating this science, highlighting its interdisciplinary, cultural and educational value. «



#### UM WAS GEHT ES?

Auf den Spuren von Plinius dem Älteren und seinem Werk „Naturalis Historia“ werden chemische und fachübergreifende Sachverhalte untersucht.

