PhD course in Models and Methods for Material and Environmental Sciences – XXXIX cycle

From pollen morphology to past and present flora composition: harmonising pollen taxonomy and plant species diversity across Italian biodiversity hotspots

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The PhD project's objective is to investigate plant biodiversity changes over long time periods (on a centennial to millennial scale) in Italian biodiversity hotspots through a palynological approach. More specifically, it aims to study the environmental changes – both naturally and anthropogenically driven – occurred in the past and their effects on the modern plant biodiversity and landscape in national biodiversity hotspots.

Three high-naturalistic value study areas have been selected for the investigation: the humid zones of Fontana Gigante and the San Genuario Swamp (province of Vercelli, Piedmont), the Brignola and Raschera Lakes in the southwestern Alps (province of Cuneo, Piedmont), and the Castelporziano Presidential Estate Natural Reserve (Rome). Each site is part of its own project framework, with supervisors in archaeological and geological aspects: plant biodiversity is meant to be a bridge between the three contexts, in an interdisciplinary approach. Holocene pollen sequences will be studied to assess the long-term change in plant biodiversity of these sites, whereas modern pollen rain will be studied through moss samples.

To establish a link between microscopic (pollen) and macroscopic (flora) plant biodiversity, past and modern pollen data of the studied sites will be integrated with their floras in a newly created database. Pollen taxa detected will be harmonised before being integrated with the local floristic list, and the database will provide pollen taxonomy information as well. The very same approach will be applied with pollen datasets available on the BRAIN database – brainplants.successoterra.net, collecting hundreds of plant records from archaeobotanical studies in Italy –, in order to further implement the new database with already investigated sites.

Lastly, vegetation reconstruction modelling techniques will be applied to the newly gathered pollen data, with an attempt to improve current modelling approaches and possibly develop new ones.