Title: Taxonomic and phenotypic diversity in Mesozoic Archosaurs

Tutor: Prof. Pasquale Raia

Research program

Macroevolution is evolution above the species level. Macroevolution applies to the study of diversification processes and phenotypic trends over geological time. The inspection of macro-evolutionary models and processes offers the possibility to address important research questions in evolutionary biology, such as why do some clades have more species than others? why some are spectacularly diverse in terms of phenotypes while others present limited ecological or morphological variation? These are complex questions that share a common underlying characteristic: they all, to any given extent, concern rates of macro-evolutionary change. In recent years, these questions are becoming increasingly addressed with a renewed range of comparative methods, which solve a key problem over traditional approaches: they take into account phylogenetic effects. Since species are linked together in a web of genetic relationships, their response to any evolutionary pressure depends on those relationships. This is both biologically significant and mathematically important to consider.

Despite their enormous importance, the evolution of Mesozoic reptiles has rarely been studied in an explicit phylogenetic scenario, with the exception of massive efforts concerning either both Avian or non-Avian dinosaurs. The research program aims to fill this gap, providing the first global analysis of the evolution of the body size of Mesozoic reptiles and of taxonomic evolution.

Proposal for a PhD position

The Department of Earth, Environment and Resources at the University of Naples, Federico II, invites applicants to participate a selection for a PhD position in Earth Sciences. The doctoral program will be developed under the supervision of Prof. Pasquale Raia, and involves the implementation of comparative phylogenetic analyzes of Mesozoic archosaurian reptiles (including both crurotarsans and ornithodyrans) using RRphylo comparative methods. The candidate must possess a background in inferential statistics and comparative methods, as well as knowledge of, or better engagement with, the diversity of Mesozoic archosaurs.

The candidate is expected to scan the literature and online repositories to collect data while acquiring specific skills in the field of phylogenetic comparative methods. The candidate's working expenses will be covered by the doctoral school and the supervisor's funds. Basic equipment includes a high-performance PC and full access to the University of Naples Federico II library. The candidate will spend a period abroad (most likely in the UK), in order to deepen his knowledge on the diversity of the Mesozoic Archosaurs (don't expect to just play with numbers!).