

Profile N° (à remplir par VAS)	FUNDING Planned  Obtained
<b>Sheet abstract of thesis 2017</b>	<b>Disciplinary Fields</b> Entomology, paleontology
Thesis Title : (1-2 lines) Taxonomy, phylogeny and biogeography of myrmicine ants: insight from Cenozoic fossils	
3 keywords : (1 line) Formicidae / Evolution / Fossils	<b>ACRONYME</b> MYRMEFOS
Unit/Team of supervising : (1-2 lines) UMR CNRS 6118 Géosciences / Equipe Biodiversité : Interactions, Préservation, Evolution	
Name of the scientific director and co-director : (1 line) PERRICHOT Vincent (Géosciences, Univ. Rennes 1)  Name of co-director: WANG Bo (Nanjing Institute of Geology and Palaeontology, China)	
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<i>Socio-economic and scientific context (10 lines)</i>  Ants have a tremendous impact on terrestrial ecosystems. Since their origin more than 100 million years ago, ants have come to occupy most terrestrial environments and have developed a plethora of interactions with other organisms. Myrmicinae are the most diversified ant subfamily, comprising almost 50% of the nearly 14,000 described extant species. Substantial advances have been made in the last decade on our understanding of the evolution of this hyperdiverse clade, but results are essentially based on molecular analyses and are yet poorly supported by paleontological data. Without numerous and robust fossil calibration points, the divergence time estimates and biogeographical evolution of the myrmicine lineages are yet unclear. The incorporation of new fossils in the existing evolutionary models will help to fill this gap.	
<i>Assumptions and questions (8 lines)</i> Recent works on ant evolution, including molecular phylogenetic analyses and diversification hypotheses, suggest a Cretaceous origin of myrmicine ants, in the range 75–100 Ma. But the earliest definitive fossil myrmicines are Cenozoic, known from the Early Eocene (50-55 Ma). Yet they are already diversified and some taxa even belong to extant genera, thus supporting a more ancient, Cretaceous origin of this clade. Recently discovered fossils, however, are incongruent (i.e., older) with the molecular divergence times estimated for some extant genera. The thesis will focus on the following questions: 1/ when did the first Myrmicinae appear? And 2/ when and how did the modern lineages (= genera) diversify during the Cenozoic?	
<i>The main steps of the thesis and demarche (10-12 lines)</i> The work will be based on the study of numerous new fossil ants from various amber deposits that were recently discovered (Eocene of France; Miocene of China and Ethiopia), as well as historical insect deposits (Eocene of Baltic Region; Oligocene of France; Miocene of New-Zealand). The PhD student will perform detailed taxonomic and phylogenetic studies of these fossils based on morphological analyses. He/she will then include the most relevant fossils as new calibration points in molecular phylogenetic analyses to test and complement the current hypotheses on the timing of the diversification of the myrmicine lineages. Finally, he/she will include the new fossils in a database of the geographical distributions of all fossil and modern myrmicine genera, for comparison of the community structures in the different biogeographical regions to evaluate the biodiversity dynamic of the myrmicine ants since the Eocene.	
<i>Methodological and technical approaches considered (4-6 lines)</i> - Systematic descriptions: optical microscopy and synchrotron imaging. - Phylogeny: morphological analyses (standard phylogenetic softwares: TNT, Mesquite, Paup, ...) then molecular analyses using new fossils as calibration points (to be included in existing or new phylogenetic models using BEAST, Mr Bayes, ... softwares). - Comparative analysis of modern and fossil distribution and composition of genus-level taxa (statistical methods: ordinations, multinomial logistic regression).	
<i>Scientific and technical skills required by the candidate (2 lines)</i> - Master's degree in paleontology, entomology, systematics, or evolutionary biology. - Experience with the following is an asset: myrmecology, morphological and/or molecular phylogenetics, 3D imaging softwares (VGStudio Max, Avizo, ...).	