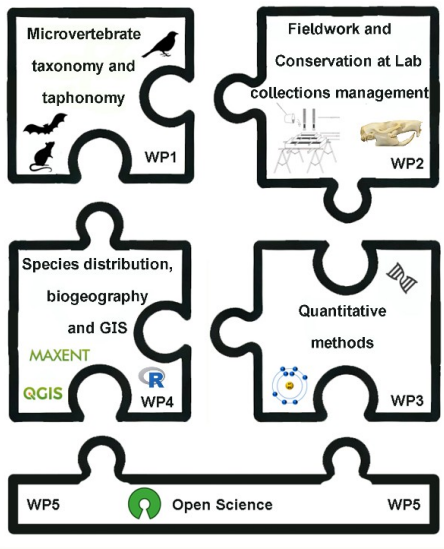
PALPROX Overview

The Marie Skłodowska-Curie Actions (MSCA) are the European Union's flagship programme supporting the training, mobility, career and skills development of researchers at a doctoral and postdoctoral level. The Doctoral School PALPROX is a Marie Skłodowska-Curie Doctoral Network Action (MSCA-DN) https://cordis.europa.eu/project/id/101226472

It fosters a unique interdisciplinary and collaborative research frame where the Doctoral Candidates will work on their Individual Research Projects around a common program: The use of small vertebrates as a proxy in Prehistoric Archaeology.

We aim to study Late Pleistocene small vertebrates, addressing the new challenges posed by interdisciplinary approaches to archaeological studies, and their contributions to the debate about climate change and biodiversity loss. Small vertebrates, due to their reduced size, small distribution ranges and, in most cases low mobility, are known to be more sensitive to regional changes than large mammals and plants, especially in Europe, where mountain ranges and sea barriers block their retreat to the south.

In addition, fossil small vertebrates can help to modern conservation biology, providing predictive clues based on long-term biodiversity archives. In general, knowledge of the small vertebrate Quaternary record can help to better understand current extinction dynamics, response to climate changes or ecological turning points.



Summary of the Work Packages

Finally, taking advantage of synergies with other disciplines, fossil small vertebrates' studies have incorporated new methodologies such as Geometric Morphometrics, Stable Isotope studies or ancient DNA, and introduced geospatial and ecological niche model tools into the analyses of both fossil and modern specimens. These approaches very much complement, but do not replace, a basal training in the fundamental methods based on osteological and morphometric description.

The Doctoral Candidates will work on individual projects, but share the common general objectives of all Work Packages. In this way, they will acquire the responsibility of performing their individual research with specific goals while, at the same time, contributing to the common three core questions, and working as a team. They will learn the importance of teamwork, collaboration and communication within a team across all the Work Packages.

As a result, PALPROX will support promising worldwide Doctoral candidates, passionate about interdisciplinary research, supporting the increasing diversity of career paths in Europe's research landscape, and providing fellows with the training, mentoring and career development support needed to become leaders in academia and beyond.

PALPROX addresses three core Queries (Q) and Objectives (OBJ) that will come across the specific Research Questions of the 9 Individual Research Projects (IRP) funded:

Q1. What are the main mechanisms of morphological and ecological adaptation of the small vertebrates species under study in response to environmental changes?

> OBJ.1 Integrating the study of morphological and ecological adaptations observed through advanced techniques such as micro-computed tomography (micro-CT), three-dimensional geometric morphometrics (3D GM), geochemical analyses, and environmental reconstruction techniques.

Q2. How have the climatic changes of the Late Pleistocene influenced the distribution, evolution and adaptation of that species concerning Human Palaeoecology?

> OBJ.2 Investigating the impact of climate change on the morphology, distribution and ecological adaptations of various species of small mammals (rodents and chiropterans), and birds (corvids) as a reflection of Human Palaeoecology in three European biogeographic regions during the Late Pleistocene.

Q3. What are the migration, extirpation and extinction patterns, population dynamics and responses of the species under study to climate changes during the Late Pleistocene?

> OBJ.3 Addressing with the study of population dynamics and migration patterns, using aDNA methods for chronological inferences, Ecological Niche Modelling and Remote Sensing Data; integrate fossil and modern data to develop predictive models; and elaborate on the responses of the species under study to biodiversity loss and climate change concerns.

The 9 Individual Research Projects will be integrated into – and contribute to – the overall research programme in this way:

TITLE	CONTRIBUTION TO THE OVERALL PROGRAMME
Advancing 3D Geometric Morphometric approaches applied to the appendicular skeleton in cryptic bat species	Pushing ahead in the understanding of morphological features of certain bat species using 3D geometric morphometric techniques, providing insights into their ecological responses to environmental changes (Q1), (Q3)
The diversity of the European Pleistocene Corvidae species: evolutionary trends and palaeobiogeographic implications using GIS tools	Examining the evolutionary tendencies and biogeography of the corvid family using GIS to understand their adaptation mechanisms and migration patterns in the face of climate change during the Late Pleistocene (Q1), (Q3)
Evolutionary history of rodent vole cryptic species and biogeography	Exploring the evolutionary history and biogeography of cryptic vole species, shedding light on their morphological adaptations and population dynamics in response to Late Pleistocene climate changes (Q1), (Q3)
Evolution of ecological niches in rodents through time	Investigating the evolution of rodents' ecological niches, using niche modelling methods to understand their responses to environmental changes and their migration patterns through time (Q1), (Q3)
New and integrated statistical approaches to estimate Late Pleistocene climate changes through the study of fossil small vertebrates	Developing statistical methods to estimate climate changes in the Late Pleistocene, using fossil data to understand the impact of these changes on small vertebrate species and their adaptations (Q2), (Q3)
Late Pleistocene climatic changes and human paleoecology: ecological and geochemical analysis in rodent remains	Analysing isotope signals of fossil rodent remains to infer ecological and climatic conditions of the Late Pleistocene, providing insights into the interactions between climate changes and human paleoecology (Q2), (Q3)
Small vertebrates population dynamics and major climatic events in Europe during the early Late Pleistocene (MIS 5 to MIS 4)	Delving into the population dynamics of small vertebrates in relation to major climatic events, using fossil records to understand their responses to environmental changes (Q2), (Q3)
Using SAR (Synthetic Aperture Radar) images to determine the influence of paleo-rivers on the distribution of microvertebrates	Applying SAR images to study the influence of paleo-rivers on microvertebrate distribution, integrating remote sensing data to understand their past habitats and climate adaptations (Q2), (Q3)
Identification of potential archaeological sites for microvertebrates using Remote Sensing data	Using Remote Sensing data to understand microvertebrate distributions in the past and their environmental contexts, as a tool to identify potential archaeological sites (Q2), (Q3)

The consortium of this Doctoral Network is composed of institutions from four countries:

Spain: Institut Català de Paleoecologia Humana i Evolució Social (IPHES-CERCA) www.iphes.cat and Universitat Rovira i Virgili www.urv.cat/en/

Poland: Uniwersytet Warszawski, Faculty of Archaeology https://www.archeologia.uw.edu.pl/en/new-main-page/ and the Laboratory of Paleogenetics and Conservation Genetics at the Centre of New Technologies https://cent.uw.edu.pl/laboratory-of-paleogenetics-and-conservation-genetics/

France: CNRS-UBE-EPHE UMR-6282 Biogéosciences, Université Bourgogne Europe https://www.ubfc.fr/en/

Portugal: Spatial Biology Lab (SBLab) from the Faculty of Sciences (FCUP) of Universidade do Porto, https://sites.google.com/view/spatial-biology-lab

In addition, PALPROX has as Associated Partners the companies Transmitting Science, S.L. www.transmittingscience.com and Paleoymás, S.L. www.paleoymas.com

The supervisors are leading researchers in their fields, and mentors with extensive expertise in research supervision and teaching in the different fields interplaying in this Doctoral Network. All the assigned PhD supervisors are experienced in predoc and post-doc supervision in their own research area, some of them participating in PhD-level and Master-level educational programs by teaching different subjects to graduate and non-graduate students.

Supervisor name	ORCID number	Institution and affiliated institution
Juan Manuel López-García	https://orcid.org/0000-0003-1605-9763	IPHES-CERCA
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Joaquim Esteves Da Silva	https://orcid.org/0000-0001-8478-3441	Universidade do Porto, Faculty of Sciences, Full Professor. Director of its Doctoral School

All the participating organisations have all the technical, administrative and human capacities to benefit the Doctoral Candidates. They are equipped with state-of-the-art labs and complementary facilities to carry out both the IRPs, the training activities, and the administrative issues.

Regarding institutional arrangements, the Doctoral Candidates will be provided with suitable desk spaces, laboratory and fieldwork facilities, as well as full access to scientific libraries and databases. They will have the needed administrative support in smooth coordination across the different institutions and countries. Associated Partners also have all the capacities needed to provide specialised training and non-academic role models.

Description of infrastructures and technical equipment to be potentially used in this Doctoral Network.

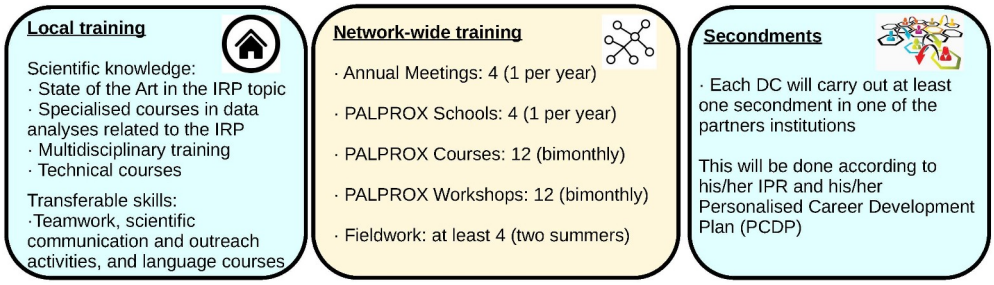
IPHES-CERCA (Tarragona, Spain)	
Fieldwork communication technologies	Communication technologies applied to archaeological research with clustered computing equipment for the management and analysis of data sets, specialised in data recording, and fully adapted to the needs of the Quaternary archaeological excavations as well as paleontological excavations in general.
Collection Service	Both for fossil materials (240m^2) and biological reference collections (56m2). This facility has the international CITES Accreditation (Convention on International Trade in Endangered Species of Wild Fauna and Flora) in order to manage zoological collections in accordance with best ethical procedures. It houses the materials for different sites to study.
Micropalaeontology Laboratory	To develop research on small vertebrates in taxonomy, biochronology, paleoecology, palaeoclimatology, taphonomy, biodiversity, histology, or biochemistry. It also has a space for washing-sieving sediments, and shelves for the storage of sediments and technical boxes to curate material.
Multi-scalar microscopy	Facility with a range of low to high power microscopes, among others, two USB microscopes (PCE-MM200 and Dino-lite) for versatile magnification and image capture, a Euromex DZ1 stereomicroscope, and a Hirox KH8700 3D digital microscope to obtain 3D views.
Biomarkers Laboratory	Designed as a sample preparation lab for stable isotope and trace element analyses including bones, teeth, shells, plants, hair/fur, and skin. Samples are obtained and treated for IRMS and ICP-MS measures. Grinding, drilling and extraction treatment areas are distributed and separated in the lab.

Uniwersytet Warszawski (Warsaw, Poland)	
Laboratory of Fossil Small Vertebrates	Faculty of Archaeology. The laboratory is equipped with 2 binocular stereomicroscopes with a camera (Leica EZHD and Zeiss Stemi) and 2 portable USB microscopes. It houses the materials from the Polish sites to study for and has access to the Italian ones.
Laboratory of Specialist Archaeological Analysis	Faculty of Archaeology. The laboratory is equipped with a Keyence VHX-X1 series digital microscope for high-resolution analysis and 3D imaging and 6 stereomicroscopes (Zeiss Stemi)
Ancient DNA Clean Laboratory	CeNT UW. It hosts a fully equipped ancient DNA laboratory with all the equipment required to perform genetic analyses of ancient specimens.

CNRS-UBE-EPHE UMR-6282 Biogéosciences (Dijon, France)	
GISMO technology platform	Covers a wide range of disciplines, from isotope geochemistry to molecular ecology and population genetics (Geosciences, Environ. Sc., LS.). It is specifically focused on 3D and multispectral imaging, including mCT scanners, 3D surface scanners, photogrammetry setups, and a portable LIDAR station.
Zoological Collection of Reference	It houses a very large collection of current and fossil rodents (skulls and teeth), accessible to consult materials and acquire data. In addition, it houses the materials from the French archaeological sites to study for.

Spatial Biology Lab (SBLab), (Porto, Portugal)	
Processing computing facilities	Three workstations, equipped to run very heavy computing processes, such as ecological niche models. The three workstations have an i7 CPU with several cores, and 64 GB, 32 GB, and 32 GB of RAM, respectively. One has a hard disk of 8 TB; the other two have a hard disk of 4 TB.
Data Storage Facility	NAS: It is a 16 TB professional storage system to store all the results from the ecological niche models. It is accessible through the internet. It works as a private cloud system accessible through the internet in order to store all the results from the ecological niche models, and eventually as a second data infrastructure for the Consortium.

The training for the Doctoral Candidates is grouped in three major categories, entailing drill in an action or event per month during 36 months, which include the Local training, the Network-Wide Training Events, planned as an intensive way (Block Plan Scheduling), and at least one secondment in one of the partner's institutions, according to each IRP.

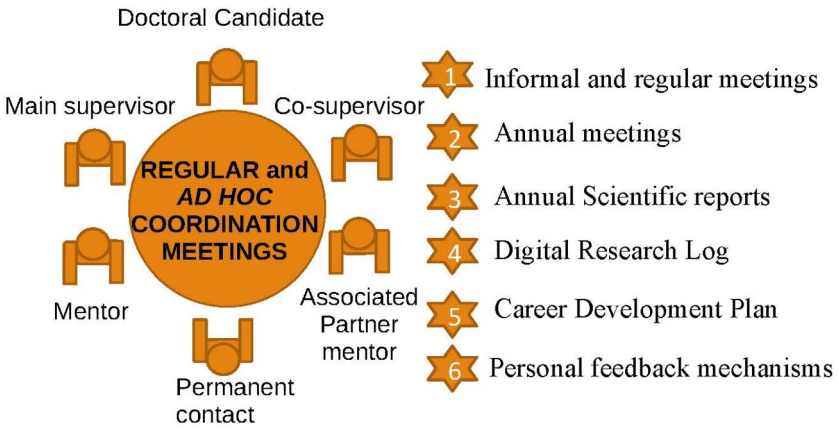


A summary of the expected training to receive, organised in the table by Annual meetings, Schools, Courses, Workshops and fieldwork activities.

Main Events & Conferences	ECTS n.40	Lead Institution	Contents / Aims	Approximate Date
Annual Meeting 1	-	UNIWARSAW	Detailed explanation to DCs of the main procedures, roles, management and timelines of the DN	March/April 26
Annual Meeting 2	-	CNRS-UBE-EPHE UMR-6282	*In itinere* evaluation of Network development, fostering concrete synergies with each IRP	April 27
Annual Meeting 3	-	UPORTO	Exposition of the IRP results to invited peers from interrelated fields as Palaeoclimatology, Biogeography, Geochronology and Prehistory	April 28
Annual Meeting 4	-	UNIWARSAW	Monitoring of the IRP results through formal discussions between the DCs and invited peers from interrelated fields	April 29
Palprox School 1	1	UNIWARSAW	Taxonomy and Taphonomy of small vertebrate	April 26
Palprox School 2	1	CNRS-UBE-EPHE UMR-6282	Study cases on the MorphOptics technical platform	April 27
Palprox School 3	1	UPORTO	Crossing Quantitative Methods with species distribution, GIS and palaeogeography	April 28
Palprox School 4	1	UNIWARSAW	Prospecting careers and non-academic paths	April 29
Fieldwork season 1, formal course	1	CONSORTIUM	Safe working conditions and practices for recovering raw material and sorting sediments	July 26
Fieldwork season 2, formal course	1	CONSORTIUM	First-hand practices managing a fieldwork lab, and recovering reference material (e.g. bones from birds of prey pellets)	Aug. 26
Fieldwork season 3, formal course	1	CONSORTIUM	Keeping material according to its nature (cranial or post-cranial and species of greatest interest), spatial (squares and coordinates) and stratigraphic position (level and depth)	July 27
Fieldwork season 4, formal course	1	CONSORTIUM	Defining sampling strategies and the unit of record of findings (sublevels)	Aug. 27
Workshop 1 Online	2	UPORTO	How to create Research Questions, scientific papers, data papers, and presentations, scientific writing and proposals writing, tips on time management and the PhD development	May 26
Workshop 2	2	IPHES-CERCA	Conservation at the Lab and management of archaeological and reference collections. Checking the individual DMP of each IRP. RRI and gender issues and uses of Social media as a part of Public Science, linked to Scientific Communication and Communication Plans	Sept. 26
Workshop 3 Online	2	CNRS-UBE-EPHE UMR-6282	Quantitative Methods: 3DGM, biometry, morphometry, and statistics. The use of proxies to define and quantify the environment and climate. Fundamentals in chronological tools	Oct. 26
Workshop 4	2	UPORTO	Ecological Niche Modelling, biogeography, GIS, Maxent and oscyllayer dataset uses	Dec. 26 /Jan. 27
Workshop 5 Online	1	IPHES-CERCA	Peers care sessions: Preventing stress, sexual harassment and fostering well-being	May 27
Workshop 6 Online	1	UPORTO	OS practices. The use of contextual data repositories (NeotomaDB, ROCEEH and others)	July 27

Workshop 7 Online	0.5	IPHES-CERCA	Alt-Academic paths. Lectures and presentations of role models and a reflection on the short stages in the non-academic sector	Nov. 27
Workshop 8 Online	1	IPHES-CERCA	Ethics and Research Integrity, especially focused on Cultural Heritage and Conservation Biology	Dec. 27 /Jan. 28
Workshop 9 Online	1	IPHES-CERCA	Knowledge exploitation and valorisation of research, protection of results and orientation to the socioeconomic impact of research	March 28
Workshop 10 Online	1	IPHES-CERCA	Writing grant proposals: Preparing next applications post PhD. Crafting CVs, Motivation Letter and Job Interview as R2	June 28
Workshop 11 Online	0.5	IPHES-CERCA	Role models in non-academic paths	Oct. 28
Workshop 12	-	UNIWARSAW	Second formal discussion about the results of general Q1 – Q3 regarding the IRPs.	Feb. 29
Course 1 Online	0.5	IPHES-CERCA	Open Science practices and creation of a v.1 Data Management Plan (DMP) for each IRP.	April 26
Course 2 Online	0.5	UNIWARSAW	Sustainability at fieldwork: MSCA Green Charter and DNSH	June 26
Course 3 Online	1	CNRS-UBE-EPHE UMR-6282	Advanced quantitative methods 1	Nov. 26
Course 4 Online	1	IPHES-CERCA	Intro to the use of data repositories	Jan. 27
Course 5 Online	2	UPORTO	Biogeography, GIS and palaeogeography	June 27
Course 6 Online	2	CNRS-UBE-EPHE UMR-6282	Advanced quantitative methods 2	Dec. 27
Course 7 Online	2	UPORTO	Google Earth Engine and the use of R for Remote Sensing applications	Feb. 28
Course 8 Online	2	IPHES-CERCA	Uploading data to disciplinary data repositories	May 28
Course 9 Online	2	CNRS-UBE-EPHE UMR-6282	Advanced quantitative methods 3	July 28
Course 10 Online	1	IPHES-CERCA	Facing the *Viva voce* PhD presentation	Nov. 28
Course 11 Online	1	IPHES-CERCA	The UN-SDG and potential societal impact regarding the IRP	Dec. 28
Course 12 Online	1	IPHES-CERCA	Updating the CDP, planning a postdoc roadmap	Jan. 29

PALPROX will offer effective supervision, mentoring, appropriate career guidance and development, according to the MSCA Guidelines on Supervision. In addition, the Doctoral Candidates will participate in a range of communication and outreach activities, widening their communication and organisational skills and increasing their creativity and commitment to engage science and society.



Each Doctoral Candidate will define a Personal Career Development Plan (PCDP) assisted by the main supervisor and the co-supervisor of his/her IRP at an early stage of her/his recruitment. This tool will be fixed in version 1 in a common discussion during the Annual Meeting 1, being reviewed and updated periodically in order to provide a clear roadmap for the professional future of the Doctoral Candidates.