



**Scenario**  
DOCTORAL TRAINING PARTNERSHIP

**NERC**  
SCIENCE OF THE  
ENVIRONMENT

## Hominin dispersal, climate and encephalization

**Lead Supervisor: Chris Venditti, University of Reading, School of Biological Sciences.**

Email: [c.d.venditti@reading.ac.uk](mailto:c.d.venditti@reading.ac.uk)

**Co-supervisors: Joy Singarayer, University of Reading, Department of Meteorology; Sandy Harrison, School of Archaeology, Geography and Environmental Science, University of Reading; Mark Pagel, University of Reading, School of Biological Sciences.**

Modern humans arose in Africa around 200,000 years ago and subsequently migrated out of Africa eventually to occupy the entire world – the only Hominin species in an evolutionary lineage that is ~7 million years old to have done so. What was the evolutionary spark that caused this one species of upright ape to go where no others of its lineage had gone before them? This project will employ new statistical and computational techniques to test the longstanding speculation that it was our evolving lineage's response to the demands of variation in climate and geography that equipped *Homo sapiens* with the cognitive capacity to migrate out of Africa. Genetic evidence can only provide a window on the last few hundred thousand years of human evolution. For the other ~6.75 million years of the hominins, conjecture about the timing and even the number of migrations out of Africa must be tested with fossil or archaeological evidence and phylogenies.

New statistical models mean we can now construct phylogenies that will identify whether purported hominin species were true ancestors of others or if they were independently evolving lineages – the difference can profoundly affect inferences about migrations. Combining this phylogenetic evidence with geographic locations of specimens, and our recently developed biogeographical phylogenetic method, the



Modern humans reached every corner of the earth displacing all other hominin species

student will obtain a detailed migration path for all hominins. The migration path will be coupled with comprehensive dataset on brain size, measures of speciation and extinction and a dataset of spatially resolved global climate proxies that covers the last 7 million years. With these data the student will test questions that many hypotheses of how climate affects human evolution strive to answer, for example: is increasing brain size associated with increasing aridity or any other climatic/environmental factor? Do speciation or extinction rates increase or decline during periods of climate variability? Or times of aridity? Do hominin dispersals or rates of movement coincide with climatic change or pulses?

**Training opportunities:** The student will receive extensive training in statistical and mathematical modeling (including Bayesian phylogenetics and comparative methods), high performance computing, and management and manipulation of large datasets. The student would be encouraged to attend a summer school in palaeoclimatology and receive training in running climate models. The student will also engage with the University of Reading Researcher Development Program.

**Student profile:** This project would be suitable for students with a strong interest evolution and qualitative research who holds or realistically expects to obtain at least an Upper Second Class Honours Degree in biology, zoology, anthropology, climate change, meteorology or a closely related subject. A master's level qualification is desirable but not necessary.

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