Environmental genomics of water conservation in a desert-adapted rodent

Supervisory team:
Main supervisor: Prof David Murphy (University of Bristol)
Second supervisor: Dr Michael Greenwood (University of Bristol)
Dr Colin Campbell (University of Bristol)

Collaborators: Prof Abdulaziz Alagaili (King Saud University, Riyadh, KSA)

Host institution: University of Bristol

Project description:
We will explore the mechanisms that enable a desert adapted rodent species (the Lesser Egyptian Jerboa) is able to survive in its harsh, arid environment without needing to drink water. Whilst water balance is aggressively defended in all terrestrial animals, this is all the more so in those species that thrive in the desert. Water conservation is particularly vital for survival in the desert and, in the Jerboa, this is achieved through the production of a low volume of highly concentrated urine, especially following dehydration. This is controlled by a hormone called arginine vasopressin (AVP), which is made in a specialised part of the brain. AVP interacts with specific receptor targets located in the kidney to promote water reabsorption. We will carry out a detailed analysis of the brain and kidney mechanisms that enable the Lesser Egyptian Jerboa to survive in the desert. We will subject animals to dehydration, then measure the expression of genes and proteins (particularly hormones) in the brain and kidney. These data will then be subjected to mathematical analyses that will allow is to identify genes that we think are key to the survival of the animal. These data will be compared to existing datasets derived rodents living in more clement climates (rats and mice). Thus, these studies will be of great interest to evolutionary and comparative biologists. Further, our studies may well interest environmentalists, ecologists and geographers, in the context of climate change and desertification.