

# Genetics and evolution of the black rat (*Rattus rattus*), reservoir of plague in Madagascar

## ABSTRACT

Selective pressure applied by pathogens can lead to extremely rapid evolutionary changes on their hosts. It could be the case for the black rat (*Rattus rattus*), which presents populations resistant to plague (*Yersinia pestis* infection), where plague have been endemic since about one century, whereas low altitude zone (where the disease is absent) populations are plague susceptible. The black rat is the only possible plague reservoir in Madagascar. This work aims to study plague resistance in *R. rattus*, as this trait has important consequences for the disease transmission and maintenance.

Neutral genetic patterns agree with a unique colonization of Madagascar by the the black rat, 1000-2000 years ago, from Arabian Peninsula. As for humans, rat settlement would have begun by coastal regions, and latter expanded to the central highlands. Experimental work (controlled infestations and crosses) allowed the study of the resistance phenotype and its offspring transmission. Resistance level variation between plague focus and plague-free zone was confirmed and extended to other localities. Finally candidate gene and genomic approaches lead to detect genetic markers potentially undergoing divergent selection between plague focus and plague free zone than neutral loci and/or associated with experimental plague challenge issue.

**Key words :** adaptation, commensal rodent, pathogens, phylogeography, *Rattus rattus*, resistance, population genomics, *Yersinia pestis*, zoonosis.

