

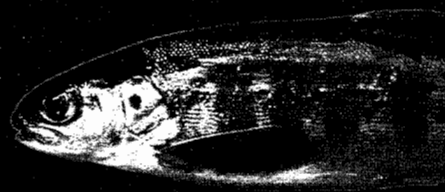
# GENETIC VARIATION, FITNESS & ADAPTABILITY



## Effects of urban colonization and rabies on the genetic structure of Swiss red fox populations

Red foxes are one of the most widely distributed mammals and are ecologically extremely flexible. They utilize a wide range of habitat types and have successfully colonized cities and their suburbs in the British Isles, continental Europe, North America and Australia during the last century. However, as a vector of rabies and other diseases, foxes are of concern for human and animal health. The Swiss city of Zurich was colonized by foxes around 1985 and the number of individuals has increased steadily. We studied whether the fox population in Zurich is isolated from rural populations or whether the urban habitat acts as a constant sink for rural dispersers using microsatellite DNA markers. Genetic variation was lower for foxes within the city compared to their rural conspecifics, whilst genetic differentiation was lower between rural populations than between rural and urban populations. Our results indicate two colonization events by small numbers of individuals from adjacent rural areas resulting in genetic drift and genetic differentiation between rural and urban fox populations. Observed levels of migration between urban and rural habitat will probably erode genetic differentiation over time.

We are investigating the impact of rabies epidemics on the genetic structure and dispersal patterns in selected Swiss study sites. Since 1969, fox carcasses from across Switzerland have been collected at the University of Berne for the surveillance of the latest rabies epidemics, which lasted from 1967 to 1996. Samples of teeth were collected from these foxes for aging purposes,



along with data on sex, geographic origin and the results of the rabies virus tests. Using the teeth samples as a source for historic DNA along with recent tissue samples we aim to describe genetic variation within and between rabies-affected and unaffected Swiss fox populations before, during and after the rabies epidemic. In addition, the genetic data gathered will be paired with individual-based demographic data by complementary aging of the tooth samples. This study should help to give an insight into general processes affecting host genetic diversity, migration patterns and demography in relation to epidemics.

Wandeler, P., Funk, S. M., Largiadèr, C. R., Gloor, S. & Breitenmoser, U. (2003). The city-fox phenomenon: genetic consequences of a recent colonization of urban habitat. *Molecular Ecology* 12: 647–656.

Wandeler, P., Smith, S., Morin, P. A., Pettifor, R. A. & Funk, S. M. (2003). Patterns of nuclear DNA degeneration over time – a case study in historic teeth samples. *Molecular Ecology* 12: 1087–1093.

## Conservation genetics of Iberian Atlantic salmon

The post-glacial expansion of southern biota into northern habitats following the retreat of the polar front some 16,000 years ago has been well studied. Less well understood, however, are the evolutionary and adaptive responses of fauna to global warming in former glacial refugia. Post-glacial warming may have constituted a strong selective force for refugial populations, and one that is likely to intensify in the near future. Investigating the molecular evolution of refugial populations in response to global warming may help us to understand the long-term effects of environmental change and population declines. In this context, new molecular techniques for analysing ancient DNA have revolutionized phylogeography and