Dissertation for the Degree of Doctor of Philosophy in Genetics presented at Uppsala University in 1996

Abstract

Gullberg, A. 1996. Genetic diversity in disjunct Swedish populations of the sand lizard (*Lacerta agilis*). Acta Univ. Ups., *Comprehensive Summaries of Uppsala Dissertations from the Faculty of Science and Technology* 221. 38 pp. Uppsala. ISBN 91-554-3798-2.

The levels and distribution of genetic variability in and between Swedish populations of the sand lizard (*Lacerta agilis*), a relict species from the post glacial warm period, were investigated using three molecular methods: multilocus DNA fingerprinting, single locus RFLP analysis and locus specific amplification of microsatellites. These techniques were also used to analyse demographic, behavioural and genetic factors like dispersal, mating tactics and relatedness which all may have profound effects on population structure and levels of inbreeding.

The genetic analyses revealed a low level of genetic variability in the Swedish populations, both in terms of number of alleles and heterozygosity, compared to a population from Hungary where the sand lizard occurs in much larger populations. The low variability in Swedish populations can be explained by a reduction of population size during immigration after the last glacial period. The existing genetic variability shows a strong subdivision between the populations, especially between isolated populations but also between populations from the same region, indicating that each relict population is genetically unique. The unexpectedly relatively high level of diversity within the relict populations indicates that the present day small population sizes probably are a recent phenomenon.

A high frequency of malformed offspring was detected in a natural sand lizard population. Experimental matings between siblings also resulted in a high frequency of malformed offspring, whereas matings between unrelated lizards gave no such offspring. The viability of hatchlings was positively correlated to the heterozygosity of their parents. The occurrence of malformed offspring in the wild probably is an effect of inbreeding, because the same kinds of malformations were detected both in the experiments and in the natural population. Furthermore, evidence was found for matings between mothers and sons in the natural population. Male biased juvenile dispersal is likely to reduce the frequency of matings between closely related sand lizards. Multiple paternity, which will increase the effective population size, and the fact that females that mate with more than one partner produce more viable young may reduce the negative effects of inbreeding.

Annica Gullberg, Department of Genetics, Uppsala University, Box 7003, S-750 07, Uppsala, Sweden

ISBN 91-554-3798-2
ISSN 1104-232X

Printed in Sweden by Reprocentralen, HSC, Uppsala 1996