

EXPERIMENTAL EVOLUTION

Summary

According to a common wisdom, hypotheses concerning Darwinian evolution cannot be effectively tested by means of rigorous experimental method. The conviction is based on a believe, promulgated by Darwin himself, that evolution acts very slowly, and apparent modifications of organisms result from accumulation of infinitesimally small changes over thousands or millions years. If this were true, experimental approach to evolutionary problems would be indeed impractical. The objective of this paper is to falsify this conviction. Already in XIX century it has been shown that adaptations to altered environment can evolve rapidly in microorganisms, and later the same has been shown both in plants and in animals. In XX century artificial selection experiments have been routinely used in plant and animal production sciences and in biomedical research, and provided empirical basis for the theory of population genetics and of natural selection. In the last few

decades of XX century various forms of experimental evolution (laboratory natural selection, laboratory culling selection, artificial selection) have become widely and successfully used by evolutionary biologists to test hypotheses concerning e.g., evolution of adaptations, tradeoffs between life-history and other traits, and also alternative models of speciation. The results contributed greatly to development of the paradigm of evolutionary biology, but the results have also shown limitations of the experimental evolution method. The major drawback is low consistency: trajectories of the experimental evolution vary between populations studied, depend on details of experimental conditions, and may change during the course of experiment. Paradoxically, however, the upsetting variation is by itself informative and contributes to understanding of evolutionary processes. Thus, even the weaknesses of experimental evolution encourage to apply the method more extensively.