

ACHIEVEMENTS OF THE 2009 KYOTO PRIZE LAUREATE IN BASIC SCIENCES

Prize Field: Biological Sciences (Evolution, Behavior, Ecology, Environment)

Dr. Peter Raymond Grant
Dr. Barbara Rosemary Grant

Demonstrating Rapid Evolution Caused by Natural Selection in Response to Environmental Changes

Dr. Peter Raymond Grant and Dr. Barbara Rosemary Grant have conducted field studies since 1973 on Darwin's finches on the Galápagos Islands, demonstrating that the morphology and behavior of organisms are altered rapidly by natural selection in response to environmental changes. Their detailed research on evolutionary mechanisms has made enormous contributions to evolutionary biology and ecology, and made profound influence on the general public through demonstrating evolution by natural selection in the field.

The most impressive achievement of the Grants is their detailed study of how, within a dramatically changing natural environment, the beak size and shape of ground finches (genus *Geospiza*) have evolved rapidly by natural selection, as well as the mechanisms and conditions for the rapid evolution. Although there had been attempts to show natural selection before their work, the Grants were the first to closely trace evolution taking place in the field over more than 35 years; and first to study, in detail, all the aspects related to the evolutionary changes, such as the ecological factors responsible for natural selection, evolutionary responses, the directions in which many traits evolve, and the mechanisms that maintain the genetic variation necessary for evolutionary change. In evolutionary biology, where experimental studies tend to be difficult, the Grant's empirical research has made the most important contribution since Darwin toward making evolutionary biology a science in which proof is possible.

Through long-term research on Darwin's finches on the Galápagos Islands, the Grants have also elucidated a variety of evolutionary phenomena. These include the relationship between birdsong and reproductive isolation, genetic correlations among traits and their evolutionary changes, migration to new islands and the "founder effect," detection of inbreeding depression in natural populations, genetic introgression due to hybridization, and character displacement caused by dramatic environmental change. Their research has set a standard for the field study of evolution, exerting a far-reaching influence on the study of evolution in other organisms.

In addition, the achievements by the Grants have helped to promote an understanding of evolutionary phenomena among the general public. Their work has also suggested the significance of evolutionary biology in coping with on-going environmental change. Their contributions to evolutionary biology as a science certainly deserve the highest recognition.