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Development of distinct colonies of genotype in a sympatric model of diploid entities

As part of an investigation of sympatric speciation this study used a computer model of a population of diploid entities to investigate the development of stable colonies of genotypes. The investigation tested development in variously shaped spaces where, in order to maintain a sympatric environment, uniform developmental characteristics were applied in all areas.

The objective of this work is to establish whether species can separate in a uniform environment simply by random genetic development. The study's demonstration of stable 'colonies' within a uniform space seems to imply that sympatric speciation is possible.

The computer model represented chromosomes as binary numbers, with each digit equivalent to a gene: being either 'wild' or mutated. Processes of inheritance were modelled using probabilistic rates of mutation and cross-over. The population was subject to a randomly-applied death-rate and off-spring competed for the resulting space. A key characteristic of this model was the limited range for selecting a mate and placing offspring. This places the model between models which allow panmictic mating and those which employ sexual selection mechanisms.

In a ring-shaped corridor, starting with uniform or random populations, four or five distinct colonies of genotypes developed and remained stable for several thousand generations. These colonies were similar to biological 'ring-species' but in the model all the neighbouring colonies become equally incompatible with each other. The development of these colonies was found to be related to the width of the corridor, as well as to the rates of recombination and mutation which were applied. In a narrow corridor several distinct colonies persisted whereas in a wide corridor one dominant type quickly developed.

Further study is required to establish whether these colonies can be considered as proper examples of sympatric speciation.