



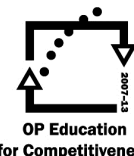
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## INVESTMENTS IN EDUCATION DEVELOPMENT

Interconnection of education between Molecular and Cell Biology  
and Ecology and Environmental Protection study programmes.

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Theme: **Genetic Diversity and Evolution: Effects on Disease and  
Diagnosis**

### Abstract:

Genomes that define the traits of organisms are either DNA-based or RNA-based. DNA replication is carried out using DNA polymerase that has the capacity for proofreading and repair. While RNA replication is carried out using RNA polymerase that lacks proofreading capacity. This means that RNA genomes are more susceptible to mutations (substitutions), and are often characterized by greater genetic diversity. In spite of the proofreading capacity of DNA polymerase mutations do occur in organism with DNA genomes, contributing to their genetic diversity. There are several mechanisms that contribute to genetic diversity including; mutations (substitutions), insertions/deletions (indels), recombination, re-assortment, and transposable elements. The resulting genetic changes may lead to; 1) individuals that are better adapted and more competitive than other members of the species, 2) individuals that display defects or disease, or 3) individuals that do not survive because the genetic changes are lethal. Genetic diversity of pathogens contributes to changes in pathogenicity/virulence, changes in transmissibility, changes in host range, and importantly in our ability to reliably detect and identify the pathogen. It is important therefore to understand the mechanisms that contribute to genetic diversity to better manage the changes that might occur, and their effects on disease and diagnosis.