Geophysical Research Abstracts
Vol. 15, EGU2013-1590, 2013
EGU General Assembly 2013

At random meetings to the creation of new species of Salamander

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The pupils in final year of high school (15-18 years old) study the notion “species” and the creation of new species in various ways.
Having studied genetic admixtures, this activity allows the pupils to build a scenario explaining the creation of a new species of Salamander in southern California from an ancestral population existing in northern Oregon. They can observe, on Google Earth, various populations of Salamander of the genus Ensatina. Salamanders of the genus Ensatina live in California around the Joaquin and Sacramento dry valleys.
In this software, the pupils get information about the salamanders’ environment and photographs of individuals and environments. During a migratory movement toward new territories to be colonized, these salamanders meet an inhospitable environment that they can not occupy. This population then splits up into two migratory branches, east and west, each overcoming the obstacles in different ways.
The two groups gradually colonized southern territories but they avoided the too dry and hot San Joaquin plains. The two main branches of the original population gradually move away from each other, and genetic exchanges between them decrease over time. Eventually, we can find various populations of Salamander on both sides of the valleys, since the salamanders occupied new territories and diversified along the way. Among mutations that randomly occur, only those mutations that are best adapted in the origin were conserved in the genetic heritage of every population. When the individuals stemming from different western populations met, they were interfertile and give fertile hybrids, which was verified in the laboratory. Likewise, when individuals of the different eastern subspecies met accidentally, fertile hybrids also could arise from these crossings.
The pupils can observe what happens in the overlap of various populations : interfertility or not. They also have geological, geographical and climatic information about the San Joaquin valleys.
However, in the southern dry valleys, having by-passed the obstacle, the fate of meeting of the final east-coming population with the individuals of the final west-coming population doesn’t allow fertilization : interfertility is impossible. It’s confirmed in the laboratory, the two populations do not interbreed.
So, the various populations of salamanders draw a ring around the dry valleys of California. The progressive genetic estrangement of populations ends then in the creation of a new southern species of salamanders in which fertility with the other salamander population is impossible. The originality of this process of speciation is that the populations of the two migratory branches establish a continuous ring of populations encircling each side of the geographical obstacle and diverging imperceptibly by natural selection or genetic drift, and while staying step-by-step interfertile along the way, where both extremities of the ring meet again, they can not reproduce.
The pupils have to explain the genetic processes by completing a map with detailed information. They can also write a paragraph but it isn’t required.
Other follow-up studies allow us to discuss the definition of “species”.