

It is now almost exactly 150 years ago that Charles Darwin published "On the Origin of Species", putting forward his revolutionary theory on how life develops. The notion of natural selection has since become widely accepted as a key principle in evolution and has strongly influenced the life sciences. A project developed at LMU Munich now uses modern animation techniques to explain evolutionary concepts to public at large, particularly to young people.

Modern media bring evolution to life

The Evolution-of-life project makes use of animations, videos and educational simulations for the Internet, museums, festivals and other events to create a better understanding of evolution via a website in several languages. It was developed by Pleuni Pennings, Coordinator of the Master's Program "Evolution, Ecology and Systematics" at LMU Munich, and Yannick Mahé of Centre National de Documentation Pédagogique (CNDP), France. "There are several reasons why it is important for young people to learn about evolution," says Pleuni Pennings. "For instance, it helps us understand our role in the world, and how we relate to other species, too." But she also stresses that evolution has been crucial to practical fields like medicine: "Without an understanding of natural selection, we wouldn't have come up with combination therapy for HIV or TB, and without combination therapy these diseases are deadly."

Evolutionary biology is about change, about dynamic processes that affect us, too. Fossils in museums will hardly reflect this dynamic aspect on their own. Moreover, they tend to present evolution as something that is "finished". In contrast, the animation featuring the water molecule Piccolina in the Evolution-of-life project shows us how things evolve. Bringing dead objects to life, it tracks how a water molecule "experiences" stages of development. Piccolina's "life" history starts around four billion years ago with her witnessing the formation of the solar system. On earth, she joins other molecules to become water. Rather more complex molecules such as nucleic acids and amino acids enter the stage. Piccolina gets trapped in a membrane together with macromolecules, and what turns out to be the first cell marks the beginning of life.

The domestication of various plants shows that evolution has by no means "stopped" or reached some sort of "goal" but is an ongoing process that we have a hand in, too. And our influence need not be to the good of development. One of the project's videos shows how over-fishing has led to cod becoming smaller, with fishermen continuously catching the largest fish and thus conveying an evolutionary advantage to the smaller ones.

Since a protein can't be made from a DNA sequence in a classroom, students at school can't do any experiments in evolutionary biology. However, interactive learning can be enabled by educational simulations. For instance, there is a "time machine" that takes the "traveler" back through the earth's 4.5 billion years of history. Other simulations feature the crea-

tion of a DNA family tree and manipulating the earth's mass and its distance to the sun to find out the right conditions for water to occur on earth.

Pleuni Pennings is responsible for the videos, and Yannick Mahé is in charge of the animations. They are backed by a larger team doing research, organization, scriptwriting, camera work, and post-production. Professor Marcus Hammann and his team of scientists from the University of Münster's "Zentrum für Didaktik" are keen to design educational material to go with the project. A complete course module is to be created on "Evolution in every day life", with worksheets for students and additional information and guides for teachers. In France, CNDP is going to distribute the project material via an extensive network of teachers. In the Netherlands, project partners De Praktijk, a well-known source of educational material for sciences, will inform science teachers about the scheme and make material available on their website.

In Munich, the movies have already been used in a workshop on new media for schoolchildren and will be shown at a local adult education institution. Movies will also be sent to relevant movie festivals. There is a website for the general public. And of course, with Darwin himself starring in one of its animations, the project is targeting the numerous events celebrating Darwin year!



► The water molecule Piccolina "experiences" the different stages of development: In a crack of the bottom of her pond, she meets molecules of all sorts, linking, combining and getting more and more complex.

