



Sustainable Cohabitation of Living Organisms

Professor Werner Arber

PAS President

As a result of about 3.5 milliard years of evolution of living organisms on our planet Earth, we can enjoy a large diversity of animals, plants and microorganisms. In many past scientific investigations, particular attention was paid to life processes of individual organisms. In recent times more and more attention is given to questions relating to an interdependence of different kinds of organisms living in the same habitat. Man and higher animals depend of course on finding their daily nutrition, mostly from food crops and animal products such as meat and milk. Since about 10,000 years, agriculture contributes essentially to this request.

In recent years, scientific investigations revealed highly relevant symbiotic cooperation between microorganisms and multicellular eukaryotic organisms including plants, animals and human beings. In these so-called microbiomes (1), the different partners help each other by providing particular essential functions. Think, for example, on the processes of food digestion.

Of high evolutionary relevance is the recently acquired knowledge on occasional events of horizontal (also known as lateral) gene transfer between different cohabitating organisms (2). Depending on the genetic function thereby acquired by the recipient organism, the latter can sometimes profit of an evolutionary development that had been made before by the donor organism. This process strongly depends on the same genetic language used by the donor and by the recipient organisms (3). This condition is fulfilled by the universality of the genetic code.

As we have previously outlined, horizontal gene transfer is one of the three natural strategies that contribute to the biological evolution (4). The other two natural strategies driving the process of biological evolution are, on the one hand, local nucleotide changes in the genome and, on the other hand, intragenomic rearrangement of DNA segments that can be duplicated, deleted, inversed or often translocated within the genome. The evolutionary usefulness of any novel mutant organism becomes tested by Darwinian natural selection. Many of these spontaneous mutagenesis events require a specific impact by enzyme activities (5) and sometimes also of nongenetic elements such as a structural instability of DNA parts displaying short-living isomeric forms (6).

These insights into the natural process of biological evolution had originally been obtained upon experimental investigations with microorganisms, but there is increasing evidence for their general validity for any kind of living organism. We can conclude that biological evolution does not result from accidents occurring to the genome; rather, biological evolution is actively driven by Mother Nature as a result of permanent creation by carefully securing a slowly ongoing biological evolution in the context of cosmic evolution, including terrestrial evolution of appropriate habitats for the living world.

By drawing his tree of evolution, Charles Darwin has symbolically shown that many present day living organisms must have common roots. In view of the evolutionary strategy of DNA acquisition by horizontal gene transfer, we conclude that living organisms have also a common future (2). In this context, it is obvious that we have to avoid serious loss of biodiversity, which could drastically reduce future evolutionary developments of cohabiting organisms in their potential habitats. However, we are aware that some biodiversity components may occasionally become extinct. This can sometimes include a loss of a particular biological activity that could, at some future time, beneficially contribute to the human civilization. Measures to safeguard ("domesticate") such functions have recently been developed (7). Nevertheless, we should try to prevent by our life-style to actively contribute to extinguish other forms of life and thus, to reduce biodiversity on our planet. Only careful cohabitation with many other kinds of organisms can ensure a long-term sustainable development of our civilization.

Scientific insights into the slowly ongoing cosmic evolution indicate that solar energy can still be provided to Earth for about three milliard years, unless our planet must suffer from an unpredictable collision with a large celestial body.

Scientific conclusions on the slowly progressing evolutionary process can find full support by religious views that mankind is the crown of evolution on our planet and that we can act as shepherds of the Creation.

Thereby, we have the right to profit of the encountered rich biodiversity, but by carefully avoiding any loss of biodiversity by our activities.

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