CONSERVING THE BIOTA: THE WAY TO ECOLOGICAL SAFETY

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The residence time for principal nutrients in the environment due to biologic production and destruction is of the order of a decade, that is about 10^4 times less than that produced by geophysical processes. Thus the biota, including its natural flora and fauna, is capable of quickly compensating for external penturbations or random fluctuations of properties of the environment. That statement is supported by the fact of the observed constancy of the environment during large time periods of the order of 1000 years. The growth of inorganics concentration in the environment is compensated by the biota via transforming these substances into their low-activity organic forms; decomposing the organics it is capable to increase in case of need the concentration of environmental inorganics as well, thus changing the degree of openness of biochemical cycles. That property of the natural biota is similar to operation for the Le Chatellier principle, which supports the physically and chemically stable equilibrium systems in nature [1,2]. It is apparent that to run such a regulatory function environmental stores of nutrients in both their organic and inorganic forms should coincide in their order of magnitude, which is indeed the case for the most nutrients [1].

The processes of biologic synthesis and destruction, constantly occurring in nature, sustain the environment in its non-equilibrium physical and chemical state [3], which would quickly deteriorate were the biota either strongly perturbed or destroyed. For example, the very chemical composition of the atmosphere is non-equilibrium. Low concentration of the atmospheric CO_2 is supported via functioning of the oceanic biota. The latter forms the vertical graient of CO_2 and decreases its surface (and hence - its atmospheric) concentration by the factor of about three, as compared to abyssal waters. If the oceanic upper layer biote were destroyed, CO_2 concentration in the atmosphere would almost triple. That is one of the spectracular examples of biotic regulation of the environmental conditions [1].

Thus the available empirical data show that biota sustains the environment in its state optimally fit for life, employing the solar radiarion as its energy source and compensating for random fluctuations, for external geophysical perturbations, and for directed abiogenic changes in the environment [1-3].

The concept of biologically conditioned stability of the environment contradicts the dominating paradigm of biology, which is based on recognizing the capacity of all the populations of every living species to generally adapt to any changes in the environment, which might occur due to geophysical factors. Such adaptation means changing of the biota when affected by the environment, while the retroeffect of biota upon the environment is assumed to be random and incapable of compensating for geophysical changes.

Therefore any environmental conditions are believed to be optimal for the biota adapted to them, and no such conditions are regarded as specifically optimal for biota. Finally the continuous genetic adaptation of the biota to changing environmental conditions is believed to control the observed evolution of the biota, during which the adaptation program of each species is optimized. Only the fittest survive, which are the more adapted species, and all the advantageous hereditary information consists in adaptation to environmental conditions [4].

The following contradictions are encountered within that concept:

1) if changes in the environment are only produced by geophysical processes, it remains unclear why these have not yet broken outside the limits within which life is still possible;

2) if genetic adaptation continuously follows the changing environmental conditions, one fails to understand why no transitory forms between any two species are observed in either space or time, i.e. among the co-existant species or among those discovered by paleontology. Instead species are found to retain their strict morphological constancy and discretization.

To explain away these contradictions it is necessary to alter the old paradigm, agreeing that although genetic information on the adaptation of individual to environmental conditions is indeed necessary, the dominant role is played by the information on the job (including feeding habits, general behaviour, population density, and so on) which the individual has to perform within the given community to stabilize the environment. That job constitutes the only reason of existance of each species within the biosphere, man included. A contradiction-free explanation of the biologically controlled stabilization becomes then possible, thus removing the first contradiction of the old biological paradigm.

The suggested understanding does not in any way prohibit evolution (actually observed according to paleontological data as formation of species); within the new paradigm it appears to be an accompanying process only, spontaneously occurring in the existing information-bearing molecular structures due to extremely rare double, triple, and higher order mutations, which carry sensible information. Thus a hardly penetrable barrier is formed for transition from an old to a new species. The latter feature explains the observed stability and discrete nature of each species, its genetic structure only oscillating due to singular mutations which first disrupt and then restore the normal genetic information pool. Thus the second contradiction is removed. The possible mechanism of evolution is the horizontal transfer of fragments of the genom formed by single-cell procariotes, the latter being the only form of life capable, on the account of their number and generation frequency, to produce enough of those extremely rare sensible combinations of double, triple, and higher order mutations [1].

Thus a new concept is suggested of ecological safety, based on recognizing the fact that the environment is geophysically unstable, the biota serving as its stabilizer, which retains the environment within the margin of possibility of life.

References

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