

EDITORIAL COMMENT

For Variety's Sake!

Science has latterly disintegrated very widely into specialized disciplines. This is particularly true in biology, where hierarchical organization-levels range from mere components of molecules right up to the entire Biosphere. Can there be any scientific communication between, say, a molecular biologist and a Biosphere ecologist? According to the reductionists' view the answer is, obviously, yes. A holistic opinion, however, might deny this possibility. I shall argue below that, keeping in mind all the dangers of reductionist philosophy, very important discoveries are being made in molecular biology which could modify our understanding of population biology, of community biology, of ecosystem processes, and even of the functioning of The Biosphere as a whole.

Genetic Variation Chiefly in Nature

Sophisticated methods of protein separation (mainly electrophoresis) and, more recently, of DNA characterization (restriction endonuclease treatments and DNA sequencing), have revealed large ranges of genetic variation in almost every sexually-reproducing species, whether plant or animal, living in a natural habitat. It has been accepted ever since Darwin that genetic variation serves as the 'raw material' for natural selection in the processes of adaptation and evolution. The same principle was formulated explicitly by the British population geneticist Sir Ronald Aylmer Fisher in his 'Fundamental Theorem of Natural Selection'.

The very high percentage of polymorphic gene loci found in natural populations have provoked hot debates in the last two decades about the proportion of variation that is actively maintained by selection, the rest being regarded as effectively neutral. Although the problem is not yet settled, it is now clear that, even disregarding a large fraction as neutral variation, there are thousands of gene forms (alleles) in each population which are directly or indirectly participating in the complicated processes of genetic adaptation. Every new environmental challenge will modify the frequencies of these alleles towards a new equilibrium. In the absence of genetic variation, the response is limited to changes of the population size (number of individuals comprising the population), which often leads to local extinction.

Genetic diversity is thus of the utmost importance in maintaining species diversity in a multispecies biotic community. Without considering the extremely complicated pattern of interacting factors influencing species diversity in a community, and also neglecting the much-disputed diversity-stability problem, I would like to mention only the obvious fact that different communities contribute different ecosystem services (functions). The least effective communities in this respect are the very simple ones, among them our Man-made agricultural systems, such as most croplands. Thus it may well be that the composition and proportionate representation of ecosystems are of fundamental importance in many of those Biospherical processes which are so relevant to Mankind's survival.

Importance of Maintaining Genetic Diversity

Let us return now to consideration of genetic diversity within populations. Is there any reason to worry about it, if it is so plentiful? The trouble about genetic variation in a population lies in the well-known fact that it is too easy to lose but very difficult to bring back again, except by hybridization with members of another population.

Natural and seminatural biotic communities are diminishing in diversity and area nowadays all over the world—so that, actually, it is very hard work to preserve at least some selected samples of really natural ecosystems. Already quite numerous species of larger animals and plants are planned to embark on the collective modern equivalent of Noah's Ark, namely the zoos and botanical gardens and artificial reserves of the world. Consequently, practically all species on Earth (except for *Homo sapiens* and his/her parasites) are limited to smaller—often much too small for survival—populations relative to their sizes in prehuman ages.

The dependence of genetic variation upon population size has long been recognized in population genetics. Aside from the decreasing genetic diversity encountered in small populations, the troublesome side-effects of inbreeding have also to be faced. In the long run, the much-limited variation in small populations results in much-limited adaptability. In a world where both local and global changes in the biotic and physical environment are obvious even to the layman, only the preservation of genetic variation can guarantee the survival of a species provided other factors remain favourable. As Paul and Anne Ehrlich illustrated in their celebrated book 'Extinction', an airplane can fly after having lost several of its rivets, but the risk of a disaster

grows exponentially with such loss. For similar reasons, we should have taken better care of The Biosphere's rivets, the living species. Their future, in turn, is determined *inter alia* by their genetic diversity, so that neglect of this point may shake the very foundation of The Biosphere and hence of our human existence.

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* and, incidentally, the Co-Organizer and Local Agent of our Fourth International Conference on Environmental Future: Surviving With The Biosphere, which is to take place during 22–27 April 1990 mainly on the heights overlooking Budapest, and concerning which we plan to publish details in our next issue.—Ed.

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Interest and Beauty in the World

To one who, for nearly 80 years, has found our natural world fascinating and beautiful, it has become more and more distressing and emotionally painful to see it made increasingly and often shockingly homogenized and drab. The incredible diversity that makes Nature so interesting and satisfying to observe and investigate is disappearing at an exponentially increasing rate. The beauty that makes life so pleasant and worth living fades almost daily before our eyes, mainly in the names of 'progress' and profit! The only factor that will make the situation of our descendants tolerable may be that they will never have experienced the beauty that we know. If some of what is written about it persists and is read, or if photographs and paintings manage to survive and save faded inklings of what we have been privileged to enjoy, and so are seen, posterity will justly condemn us. The results of our greed and short-sightedness will be what will live after us. Our great-grandchildren will have little reason to revere us. There will surely be little trace of ancestor-worship in a future and, hopefully, more enlightened world.

One wonders why a natural landscape never becomes tiresome, why a new view—whether of mountain or prairie—is such a delight, why one never sees clashing or disharmonious colour combinations in a flower, a sunset, or a landscape. Is this something inherent in these phenomena, or is it something within us? Why is it that such things are so vivid to us when we are small children but tend to relative dullness as we mature? The latter impression may be the result of familiarity coupled with increasing preoccupation with survival in an ever-more crowded and competitive world. But our original response to what we see in Nature must be ingrained—an age-long, innate evolutionary conditioning and response to the environment in which Man developed. Instinctive recognition of what we were surrounded by during the evolution of our consciousness may be what makes us comfortable in, and responsive to, natural beauty. This beauty, itself, may be what, during our evolution, was imprinted in our nervous systems.

The clash and discordance of so much of what our artificial surroundings confront us with—colours put together in strange combinations, proportions seldom or never seen in Nature, weird angular shapes and geometrical arrangements—may well be simply things that were uncommon or not present in our evolutionary environment. Natural selection has formed us to fit and respond to what we are surrounded by. Artificial selection, resulting from more and more crowding into these increasingly unnatural surroundings, may well, as time goes on—if we survive—change us, even making us insensitive to what now pleases and satisfies us. It may make us, in the not-too-remote future, into something not very admirable from our present viewpoint.

At present it seems to us that, if there is something particularly beautiful or interesting in the world, there is always someone ready and waiting, for profit or power, to destroy or anyway change it—a jaundiced view, you may say, but one which we have become increasingly forced to adopt.

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