



Environment and Ethics

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ALTHOUGH farmers, naturalists, and other observers had long known in a general way that animals and plants are restricted to particular environments and that the presence of certain kinds of living things is favorable or unfavorable to certain others, the systematic study of relationships of this sort began less than a century ago.

Life can exist only within a very narrow range of physical conditions. Astronomers speak of temperatures ranging from several hundred degrees below zero in interstellar space to some millions of degrees above zero in the interior of the sun and stars. The biologist is concerned with only a minute fraction of this total range of possible temperatures. Since all living things contain a high proportion of water, which must be in the liquid state in order to support vital processes, life can go on only at temperatures between the freezing and boiling points of water. Few organisms can remain alive at temperatures even approaching the boiling point of water, and these only in a quiescent state, as in certain spores.

Similarly, living things require air of a certain composition. We read of planets surrounded by a dense atmosphere in which methane or marsh gas and ammonia are prominent constituents and free oxygen is lacking. It is certain that life as we know it could not exist in such a medium. With very few exceptions, every kind of organism on this earth is dependent upon sun-

light. But the light must not be too intense, as at our distance from the sun its rays would be without a filtering atmosphere; yet light must not be too weak, as in the case of starlight.

A physiologist might inform us whether a given kind of animal or plant, adequately fed, watered and protected, could survive for a day or a month on some part of the earth's surface where the meteorological conditions are known. However, the kind of studies he makes are quite inadequate to disclose whether this animal or plant could survive without human care, and reproduce its kind, in any particular natural environment.

Survival depends not merely upon the physical environment but also upon the other living things which happen to be present in these surroundings. The branch of biology which treats of the relations of organisms to their total environment, lifeless and living, is known as ecology.

Natural Communities

The ecologist is concerned with natural communities, each of which consists of few or many kinds of plants and of the animals great and small which live among them, depending upon them for food, shelter, and other vital needs. Some communities consist of comparatively few species of animals and plants, whereas others are far more complex.

An example of a simple community is a cattail marsh which contains few conspicuous plants, save the cattails themselves, although careful investigation discloses many varieties of small

and microscopic plants which thrive among them, and animals of numerous kinds are not lacking. An example of a complex community is a tropical forest, with its bewildering array of great trees, many of them burdened with masses of air-plants, its creepers, palms, ferns, and low herbs, and all the birds, monkeys, reptiles, insects, and other creatures which thrive there. In all parts of the world where life exists it is possible to recognize natural communities, and practically every living thing belongs to some community.

The study of these natural communities, even the simpler ones, reveals their vast complexity. Directly or indirectly, every member seems to interact with every other member, affecting individual and collective welfare in ways great or small. The plants provide nourishment for the animals, which are incapable of synthesizing nutriment from inorganic matter. The animals serve the plants by carrying their pollen from flower to flower, by scattering their seeds, by stirring up and aerating the soil, as earthworms do. At the same time some of the animals do great harm to the plants by devouring their foliage, flowers or other parts, or, in the case of the larger creatures, by breaking and crushing vegetation as they move about.

The first requisite of any natural community is the presence in it of organisms, nearly always green plants, which build up organic compounds from the simpler substances found in earth, water, and air. However, it is equally necessary that there be other organisms to carry on the reverse process, the breaking down of organized tissues into their simpler constituents. Without the bacteria, fungi, and small animals which decompose the larger organisms, the dead leaves, stems and flowers of plants, the carcasses of animals, would litter the ground in ever-increasing profusion, until vital processes would come to a halt because all the necessary materials would be locked up in lifeless bodies.

If the constructive processes were not approximately balanced by the destructive processes, the world would eventually become a sort of vast museum of the wonderful structures which life could create, but there would be no

more growing, moving things to enjoy the sunshine.

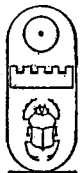
Co-Operators and Competitors

We often find it convenient to divide the people around us into friends and enemies, co-operators and competitors; and similarly, when we think of any kind of plant or animal in its natural community, we try to classify the other members of that community as beneficial or injurious to it. But deeper study shows that this is a rather naive way of proceeding. In any association of living things, human or otherwise, it is very difficult to draw the line between co-operation and competition. Co-operators are easily turned into competitors, and competitors often help each other in subtle ways—a fact recognized by a merchant when he locates his shop close to another which sells the same things.

A plot of bare ground in a forested region is soon colonized by many more seedlings than can find room for their full development. They compete strenuously among themselves for a place in the sun, and many succumb in the struggle. But the crowding causes them to grow straight and tall instead of sprawling outward, and the clustered foliage mitigates the sun's rays for the more tender plants that could not endure their full intensity.

Similarly, we look upon the great cats and other carnivores as enemies of the deer, antelopes, and other herbivorous animals on which they prey. Yet when we remove them we find that the grazers and browsers multiply to such a degree that they destroy the vegetation on which they subsist, and then die of slow starvation even more horribly than when struck down by a lion or a tiger. So complex, so incapable of facile schematization, are the interactions among the members of a natural community!

It is often difficult to decide whether some species of plant or animal is in the long run beneficial or injurious to some other species, but it is far more difficult to learn the ultimate effect of a whole class of organisms upon some other class. We commonly think of hawks as enemies of the smaller song-birds, and some of the former prey



heavily upon the latter. But other kinds of hawks feed largely or almost wholly on snakes, and some kinds of snakes devour many of the eggs and nestlings of birds; so, it is possible that hawks, taken as a class, are more beneficial than detrimental to songbirds. And serpents not only destroy birds but also eat some of the enemies of birds, so that to eliminate all the snakes from an area of woodland might not bring about the increase in its avian population that we expect.

Much has been made of the role of the smaller birds in keeping in check the insects which at times so conflict with the interests of man. The United States government once conducted an exhaustive survey of the dietary habits of the different species inhabiting the country, making painstaking analyses of the food taken by each specie, and separating the insects, each consumed, into those beneficial and those injurious to agriculture. But some kinds of insects prey upon or parasitize others, and it is difficult to decide whether the predatory and parasitic insects eaten by birds might not, if left alive, have been more effective than the birds themselves in reducing the numbers of the deleterious sorts.

Perhaps the bird lovers and poets who have painted such frightening pictures of what would happen to our orchards and farms, and ultimately to ourselves, if we destroyed all the songbirds, exaggerate the situation. We do not know.

Stabilizing Associations

From the complexity of the interactions of the several kinds of creatures forming a natural community, and the subtle manner in which they co-operate and compete, it results that the greater the variety of organisms a community contains, the more stable and enduring it is likely to be. The simpler communities, composed of relatively few kinds of plants and animals, are in many cases transitory. Often they represent early stages in the colonization of new or denuded land, and they gradually prepare this area for occupation by a more varied and stable association of living things.

Although there are a number of reasons for the greater stability of the

more varied community, among them we might notice the greater immunity from diseases and plagues which its members enjoy. A pure stand of plants of any sort, a crowded settlement of men or other animals, offers optimum conditions for the rapid spread of an infectious disease or of some destructive insect pest. When plants of one kind are separated by plants of other kinds, the latter act as barriers to the dissemination of the plague, which as a rule attacks only one kind of vegetation, or at most a group of related species. Similarly, the fewer the contacts between animals of the same kind, the more slowly a disease spreads through the population.

In the vast forests of the Amazon basin, the Brazilian rubber tree continues to flourish amid a great variety of trees, despite a fungus which attacks its foliage. If one makes a clearing in these same forests and starts a plantation of these rubber trees, he finds them so heavily attacked by the fungus that they yield little rubber; and this leaf disease has until recently defeated all attempts to establish profitable rubber plantations anywhere in the American tropics. The outstanding success of the rubber plantations in the tropics of the Old World is due to the fact that when the Brazilian rubber tree was introduced there in the last century, the fungus was accidentally left behind.

Cities and Farms

A great modern city is a community composed of a single dominant organism, with an admixture of dependent organisms such as dogs, cats, birds in cages, and plants in beds and pots, and a far larger number of parasitic or semiparasitic organisms, including rats, mice, and hosts of bacteria, many of them highly injurious to the dominant animal—man. It is difficult to point to any similar aggregation of comparable size—measured in number of inhabitants—composed so exclusively of a single kind of animal. The less populous hives of bees and nests of ants seem usually to harbor a relatively larger number of parasitic insects and hangers-on of various sorts.

But these human communities are far from self-supporting. They would cease to exist if they did not each day

Dangers of Wholesale Destruction

import vast quantities of foodstuffs and other materials, some of them brought from the antipodes. Thus each human community might be looked upon as sending out roots or tentacles to a number of other communities scattered far and wide over the earth; and its prosperity depends upon the health of these other supporting communities. Or we might think of the city—along with all those regions which contribute to its life—as forming one single, complex community, discontinuous in space, its scattered parts joined by arteries along which materials flow in both directions—for the city must somehow pay in goods and services for what it receives.

Some of the materials which a city receives, such as lumber and pulp for paper, come from natural woodland; and it is obvious that these woods must form balanced, self-sustaining communities, if they are to continue to produce what the city requires. Most of the foodstuffs, as well as fibers for clothing, come from cultivated fields, where human operations create conditions different from those which prevail in communities where man has not interfered.

But a field of grain, vegetables, or cotton is by no means a pure culture, such as a bacteriologist may maintain in a test tube. The soil in which the crop grows supports a varied flora and fauna, many of whose members are so small that they escape ordinary observation: weeds sprout among the cultivated plants; insects swarm amidst their foliage; birds fly overhead or nest in the field itself. Moreover, there are usually adjacent areas of more or less "natural" vegetation, and what happens in them may have great effect upon the success of the crop. For example, animals of various sorts which breed there may come forth to eat it.

Thus the farms are by no means exempt from the operation of the processes which govern all communities of living things, and the distant cities are in turn closely dependent on the farms. In particular, it should be noted that an extensive field of grain or some other cultivated plant is, like all organisms in simple communities, composed of relatively few species, highly vulnerable to any fungal disease or insect pest that gains a foothold in it.

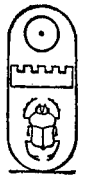
Exasperated by these plagues that so greatly diminish the farmer's profits and at times seem to jeopardize the very existence of humanity, men have devoted much thought to devising methods to control or destroy noxious organisms. Recently chemists have invented some extremely lethal compounds; whole forests and swamps have been dusted with them. Also, roadsides have been treated with chemicals which destroy almost everything that sprouts there. These successes in the wholesale destruction of undesired creatures—along with innumerable others which give us no ground for complaint—are leading to the notion that we may finally eliminate from the world all so-called noxious organisms, leaving only ourselves, our domestic animals and cultivated plants, and such other creatures as are somehow useful to us, or at least do not cause us discomfort nor diminish our profits.

But anyone who has absorbed some of the principles of ecology will at once detect the fallacies and the dangers of this shallow mode of thought. In the first place, there is the almost insuperable difficulty of finally distinguishing between friends and enemies, co-operators and competitors. An organism which directly hurts human interests may indirectly benefit us, as by keeping in check some other organism which might become even more injurious, or by preserving the balance of a natural community whose health is important to us. The bird, for example, that eats our cherries or other small fruits may also devour insects which if uncontrolled would greatly damage the fruit trees.

Ecology is such a young science, and the problems it investigates are so complex, that he would be an unusually daring ecologist who would venture to predict the ultimate effect of the complete removal from a natural community of some kind of organism which has long flourished in it.

A thriving community of animals and plants might be compared to a healthy human body; and each of the species which make up this community might be likened to one of the organs

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who has been lingering for a long time with a severe illness and has been losing vitality and strength continuously should suddenly yield up life itself during those hours when the entire body is most relaxed. Understanding, therefore, that all of us are more relaxed between two and five in the morning, and realizing the effect that this would have upon both the expectant mother

and the person who has been suffering from a long illness, we can plainly see why so many births and so many transitions occur at this time.

Again I say that this observation of the working of the cycles of life makes us realize how definite these cycles really are and how marvelous is the entire scheme of all the manifestations of the Creator in this universe.



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of that body. Doubtless some of these species are as unnecessary to the welfare of the community as tonsils and appendix are to the health of the body, and like them they may even at times endanger the community. Others are rather superfluous adornments, like eyebrows and hair on the head.

But it would require much painstaking investigation to determine just which members of the community are superfluous and could be eliminated without jeopardizing the balance of the whole association. Just as a physician would hesitate to remove any organ from a healthy body, so should we be cautious about extirpating any member of a natural community, even if it were possible for us to do so. Conversely, it is most perilous to introduce some exotic animal or plant into a natural community. We cannot predict from its behavior in its homeland how it will act among new associates upon meeting them in some other part of the world.

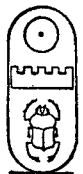
In innumerable cases, plants and animals which were fairly well behaved in their native land ran riot in a foreign country, to the vast annoyance and loss of those who were foolish enough to transport them.

In view of our ignorance of the ultimate effect of destroying—or fomenting the increase of—a species of plant or animal, what course should we follow when one of them attacks our crops or otherwise destroys our property?

Perhaps in the first place we should desist from running for guns, traps, or

poison the moment our fields or household stores are touched by some hungry animal. For often our loss will be slight, perhaps less than the cost of combatting the animal; and at a price we can well afford we can have the satisfaction of being surrounded by beautiful and interesting creatures and of having avoided slaughter. But in some instances we must take drastic measures of control, especially against insect and fungal pests, to avoid heavy losses and the ruin of a house, a farm, or an orchard. In such cases, anyone with some understanding of ecology will seek methods of control which are specific against the plague he needs to combat, avoiding the wholesale destruction of life of all sorts.

Such feats of diabolical ingenuity as spraying whole forests and marshlands with a violent poison from an airplane would never recommend themselves to anyone who respects ecological principles, if only for the reason that nobody knows enough about the interactions of the various forms of life to predict the final result of such destructive operations. Since we can draw no sharp line between friends and enemies, co-operators and competitors, we must resign ourselves to sharing the earth with creatures that sometimes annoy us, but which may at the same time benefit us in indirect ways that we fail to detect. Perhaps they merely are helping to preserve the health of the natural community of which they are a part, and whose continuance in a flourishing state is important to us.



The Ethical Viewpoint

Our consideration of ecological principles is in accord with that which we should reach through an examination of ethical principles. Moral codes have varied greatly from race and from age to age, but practically all of them, especially in the more advanced cultures, agree that it is wrong to harm one's neighbors. In primitive societies, moral injunctions lost their force beyond the limits of one's own tribe. In the original Mosaic law, "Thou shalt not kill" meant merely that thou shalt not take the life of another member of the twelve tribes of Israel—on any other supposition, the behavior of the Israelites immediately after their receiving this divinely given law is incomprehensible.

But as men's insight and sympathy continued to grow, as the tribesman's fierce partizanship began to melt into the feeling of the brotherhood of all men, moral rules were conceived as more and more widely applicable. This expansion of moral concepts finds no logical stopping place until it governs our treatment of all living things; for if we begin to apply the term *brother* to those who did not spring from the same father and mother as ourselves, we shall end by recognizing all creatures as in a sense our brothers. We all are branches and twigs of the one great tree of life.

This wide expansion of moral concepts, which Albert Schweitzer has recently brought to the attention of West-

ern civilization, took place in India thousands of years ago. Here the ancient sages proclaimed the great principle of *ahimsa*, which in its negative form means refraining from injuring any creature whatsoever; in its positive form it implies the cultivation of universal, all-embracing love. Of course, in a world so crowded with life, so full of competing interests as our own, no one could follow this principle to the letter and continue to live. Even to satisfy our hunger, we must destroy living things of some sort. For this reason the strict practice of *ahimsa* was conceived to be possible only by ascetics who had renounced the world.

For householders, including the farmers responsible for producing everybody's food, certain exceptions were made without which no one could attempt to till the soil. Nevertheless, absolute harmlessness remains the ideal even for householders, and departures from it are tolerated only when they are unavoidable if human life is to be preserved.

With this highest ethical principle, the indiscriminate destruction of living things, such as has been done in recent years, is wholly incompatible. Thus the things that ecology warns us to avoid for reasons of danger and inexpediency, the highest morality also forbids because of their being wrong. When studies so dissimilar as ecology and ethics give us the same counsel, that counsel is certainly worthy of our profound respect.



LETTER FROM POLAND

"We now have a breath of freedom, a thing to which we had grown unaccustomed for many years. A new Polish socialism is being built upon the basis of justice and truth, and though our economic difficulties are rather serious, a process of healing and Renaissance is felt throughout the land. First of all, we now have religious tolerance. We expect that in the future there will be wider possibilities for publishing firms and for the distribution of books and papers."

(Letter received from former Polish officer
of the Grand Lodge of AMORC of Poland.)