

ENVIRONMENTAL PROBLEMS CONSIDERED FROM THE VIEWPOINT OF EVOLUTION

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I am most honored to have this occasion to speak to you about the basic ideas and actual means to solve environmental problems. Everybody knows that the current environmental problems have been brought as a result of an increasing world population, the increase of energy consumption in our daily lives, and our active economic activities. Various forms of pollution created thereby have spread worldwide through the air and water to such a degree that one nation or one region alone cannot solve the problems. We are now forced to cope with this situation globally.

One may tend to think that the solution to these problems is to control an increasing population and economic activities and for each of us to reduce his or her energy consumption. The situation, however, differs from nation to nation, and thus it is not so simple to solve the problems.

I have been working on agricultural means to reduce environmental pollution, especially, on Kyusei Nature Farming, a sustainable and self-contained agricultural method which does not depend on pesticides and chemical fertilizer, and is capable of bringing economic stability and preserving the environment.

The details of my activities are described in the brochure handed to you. Those results were all brought by the application of effective microorganisms. The application of effective microorganisms originally started for agricultural production. They are now used for efficiently recycling kitchen garbage, animal waste, and waste from the processing of primary products, and for purifying sewage and polluted water of rivers and lakes, as well as for solving health problems of plants, animals, and human beings, either directly or indirectly. The application to animal waste and sewage you saw in the video movie is such an example. I think from my experience that almost all the environmental problems of unrecoverable pollutants can be solved by the application of microorganisms.

Basic Idea for Solving Environmental Problems

All the current environmental problems originated from structures of our society, and many problems have been created as a result of trying to improve our society. These structures are constructed on our social philosophy of conflict and competition. All the social systems including science and technology are constructed intending to win. As our history shows, excessive competition for winning has cost us greatly and produced a large amount of pollution. This system has been brought as a result of our excessive fear of defeat and our excessive insistence of the absoluteness of our ideas and principles. As our economic activities and information have been internationalized and attained global simultaneity as a result of the rapid development of communication media, systems of filtering out not only irrational information but also many forms of economy, technologies, and philosophies have started functioning. In addition, it is now possible to solve many problems originating from international misunderstanding by deepening mutual understanding through the frequent exchange of people. Now any country can easily learn from good examples in other countries.

Although there still remains conflict in some areas, many people are realizing that we have to pay the highest price for conflict. We are experiencing such a situation for the first time in the history of mankind. Our history is now steadily shifting from an age of conflict to that of coexistence. While we had a good prospect of avoiding world war and solving local conflict, and hoped that the twenty-first century would be an age of peace, we now have a new crisis in the environment, food production, and medicine, brought by an increasing world population.

As I have said before, this crisis has structural origins in our society. To solve it, it is thus necessary to form a new, common idea for transforming all the structures based on conflict and competition into those of coexistence and

co-prosperity.

The common idea is to realize the safety and comfort of the mind and body, low cost and high quality, and energy efficiency in all kinds of areas, consequently to form a highly information-oriented society of coexistence that is, to form an ideal society based on true structures and true technology.

Here I mean by the word "true" to have a self-contained form in which only good things and no bad things occur eventually.

Problem of Environmental Pollution Considered from the Viewpoint of Evolution

1. Primeval Earth was Mass of Pollution

In reality, people view the problem of the environmental pollution of the earth in various ways: ranging from absolute pessimists who believe that the problem will lead to the destruction of mankind to optimists who think that it is not a serious problem. On the greenhouse effect caused by the increase of carbon dioxide in the air, some people say that water evaporated by high temperature will increase the amount of snowfall in the polar regions, and consequently induce a little ice age. Nevertheless, it is undoubtedly true that the problem of environmental pollution of the earth is getting serious. Unless we take measures to stop the pollution completely, mankind will suffer an unprecedented damage even if a crisis due to the greenhouse effect or the disruption of the ozone layer does not occur.

Without considering the concept of the evolution of life, measures to preserve the environment or to stop environmental pollution will be too costly, and cannot be fundamental solutions to the problem. Human beings are also one of the creatures which appeared as a result of evolution. Although we say that we have created various compounds, poisonous substances, and radioactive substances, the sources of these substances have been existing on the earth, and we simply transformed them into different forms.

Many studies have revealed that the air of the primeval earth, where life was generated in an inorganic world, was very hot and filled with carbon dioxide, sulfur dioxide, methane gas, hydrogen sulfide, and ammonia with very little oxygen, and there were various poisonous substances and even radioactive substances on the earth. For us in the present age, such earth is just a mass of pollution, and it is obvious that higher animals could not live in such an environment.

We wonder at the existence of obligate anaerobic microorganisms, which would die quickly if they touched air (oxygen), and are surprised to find thermophilic anaerobic microorganisms, which do not die even at one hundred degree Celsius, those which decompose metal or oil, and those which are active under the existence of strong radioactive substances.

Characteristically, most of these microorganisms are highly resistant to heat, and either dislike oxygen or need very little oxygen. They cannot live in the same environment as the one we live. Thus, they live only in a limited number of places, such as soil layers deep in the soil, where there is not much oxygen, mud at the bottom of lakes, rivers, or the sea, hot water of hot springs, and animal intestines, and they are very small in number.

While many people wonder why such microorganisms that seem to be unsuitable to the present environment on the earth exist, few people realize that it is rather natural if the situation is considered from the viewpoint of the evolution of life. As I said before, the air of the primeval earth was very hot and filled with carbon dioxide and various poisonous gases and substances. We should realize that the earth did not allow the existence of organisms which like oxygen, and that only those which did not like or need oxygen could live.

2. How has the Evolution of Life Changed the Global Environment?

Many of us simply believe that the air of the primeval earth was clean and filled with oxygen. In fact, the earth was an unimaginable mass of pollution at the beginning, as I just said.

The original forms of life on the earth full of pollution started with chemosynthetic microorganisms, which prefer high temperature and on which oxygen acts as poison. They then evolved into various anaerobic microorganisms, which feed

on various pollutants. As a result, pollutants were fixed, and the earth was gradually purified in the sense we view the earth.

Then appeared photosynthetic microorganisms, which can utilize carbon dioxide, and the greenhouse effect caused by carbon dioxide was reduced. As the earth gradually cooled down, fungi suitable to lower temperatures and microorganisms which could live with oxygen appeared. They then evolved into plants. As a result of the vigorous activity of photosynthetic microorganisms and plants, carbon dioxide was rapidly fixed, and a large amount of oxygen was released. Herbivorous animals then appeared, followed by carnivorous animals, and finally evolved into human beings.

If we consider the course of the evolution carefully, we find that any organism was forced to evolve by the pollution it created by its own waste, and that most organisms which could not evolve resulted in extinction or in living only in special areas. Therefore, the groups of microorganisms I talked about, which live only in special environments, are former inhabitants of the earth. Oxygen, which is indispensable to aerobic microorganisms, is waste matter of those former inhabitants, and it is an extremely troublesome and lethal pollutant for anaerobic microorganisms. Thus for those primeval microorganisms, the air of the present earth is filled with pollutants they produced, and aerobic organisms including human beings, which live happily in the pollutants, are just filthy things.

When we consider this course of evolution, it seems to be natural that mankind will destroy itself because of the pollution it has created. However, it is unlikely that a new living thing will appear as a result of the pollution, although it may appear in a very limited environment or out in space. This is because the pollution we are producing now already existed on the primeval earth. For the earth, it is not a phenomenon of evolution but one of retrogression, and it does not have an impact upon the evolutive function of DNA. This is obvious from the fact that, if a pollutant is left piled up outdoor for a long time, we can always find, in some areas, anaerobic, thermophilic, chemosynthetic, or decomposing microorganisms.

Thus, the earth retains all genetic information from the past in some forms even if the dominant living thing and the environment of it change, and is quipped with a function of outputting such information if necessary.

Learning from the Evolution of Life

As I have described, the present problems of environmental pollution and disruption was brought from structural origins as a result of an increasing population and our various activities based on conflict and competition.

Agriculture, which is supposed to produce food to preserve human health and the environment, is creating a large crisis by degrading food quality through the introduction of chemical fertilizer and pesticides, and large machinery, affecting human health, causing the erosion of surface soil, and the degeneration and desertification of farmland, and polluting many water sources and the environment surrounding farmland. The use of farmland without considering sustainability, and slash-and-burn farming and the destruction of forests as a result of population increase are all self-contradictions with structural origins. The area of medicine is also producing many contradictions. There are many examples of medicines and wrong therapeutic or health-care methods creating new diseases. In any nation, the amount of medical expenses occupies the largest proportion of the national budget. If it continued to increase, it would cause a crisis of the national budget.

The urgent problems of pollution in industrial areas seem to be solved in the near future by a further development of technology and tougher legal restrictions, such as prohibiting the production and use of harmful substances and recovering pollutants. However, more serious and larger problems such as the increase of carbon dioxide in the air caused by the use of fossil fuel and the damaging of the ozone layer are being produced.

Many philosophies, religions, ideologies, and principles also have similar contradictions. They deviated from their original purposes of realizing the prosperity and peace of mankind, and religious conflict and the failure of ideologies are producing a large amount of sacrifice, that is, fundamental contradictions. I can continue to quote such examples for

hours. It is thus necessary for us to think why such contradictions have been put into our social structures. In short, the reason is clearly that we have neglected to evolve our society correctly. A familiar examples the case of laws and various regulations. Most laws and regulations, which are intended to maintain our social organizations normal and to protect the safety and property of each individual, are fairly effective at first. However, if they are not improved or modified according to the development of technology and society, they lose their original functions, and hinder all kinds of evolution. Some people say that bad laws are also laws. Considering that laws are justice, however, we should not consider bad laws as laws. In this way, the fundamental origins of environmental problems are all related with problems in our society.

The basic principle of evolution is not to produce self-contractions, and if a self-contradiction is produced, to evolve while incorporating it in an evolutionary way. From an optimistic viewpoint, the present world with structured contradictions has a large task of a further evolution of mankind. In this sense the global environmental problems will serve as a common theme for solving problems in our society fundamentally.

Actual Measures

The basic requirement for solving environmental problems is for us to have a common idea for coexistence and co-prosperity, and to try to make the earth function as a community. Technologically the basic method is to recover harmful substances for recycling. The largest problem here is how to process pollutants which cannot be recycled and how to deal with pollutants which cannot be recovered. I am now going to describe actual measures for solving the problems of global environmental pollution and disruption.

1. Chemicals and radioactive substances

It is necessary to oblige factories to recover the pollutants released from them and for violation to impose them a heavy penalty equivalent to death penalty or life imprisonment. Such a strict restriction can be a potential driving force for technological revolution. If emission control for automobiles and factories is made tighter, automobiles and factory products inevitably shift toward low cost and high quality. Harmful substances which cannot be recycled at all should be returned to earth's nucleus through deeps in the sea.

2. Pollution produced by agriculture

Pollution caused by agriculture and our daily lives are also serious. The misuse and overuse of pesticides and chemical fertilizer, the erosion of surface soil, the pollution of the soil and water, and pollution related with animal husbandry are all caused by structural defects of technologies. In a broader sense, kitchen garbage and sewage are also pollution originating from agriculture. To solve these problems, we should adopt production systems which do not produce pollution, that is, farming without pesticides and chemical fertilizer and with minimum necessary plowing or non-plowing, as well as purify kitchen garbage and sewage with the help of useful anaerobic microorganisms for using as organic fertilizer and non-drinking water or water for agriculture, respectively. The video movie you watched showed such examples. If we culture together various microorganisms which act on higher living things in a vitalizing way, such as useful anaerobic microorganisms used for producing fermented food, microorganisms used for producing medicine, and those living in human intestines, we can form a complicated ecosystem in which various microorganisms from primeval ages to the present coexist co-prosperously.

If these microorganisms are returned to the soil together with crop residue, weeds, and kitchen garbage, the soil is quickly fertilized, and the number of useful animals in the soil such as earthworms is increased greatly. As a result, the soil is softened, and its water-holding capacity is improved. Since the total power of the soil is enhanced, the erosion of surface soil rarely occur, and water can be utilized efficiently. If these microorganisms are put in sewage or polluted water of rivers and lakes, they decompose pollutants not in the way of putrefactive decomposition but in the way of

useful fermentation without producing foul smells. Since various plankton appear in addition, the number of useful aquatic animals, such as fish and shellfish, increases, and at the same time the ecosystem in the water rapidly becomes rich.

Waste from animal farms and factories processing marine and agricultural products, and city waste are also causing serious environmental pollution. Such organic matter can be a useful energy source for the combined microorganisms, and can be used effectively for agricultural production and the prevention of soil and water pollution. Hydrocarbon, such methane, which is produced from paddy fields and polluted water systems, and is considered to be one of the main factors damaging the ozone layer, can also be substrates (food) for these microorganisms, and is transformed into a source of soil fertilization and into food for plankton. Thus, it is used for both improving productivity and preventing environmental pollution at the same time.

A solution made by fermenting the mixture of these microorganisms, sugar, organic acid, and alcohol can be used for disease and pest control for plants as effectively as pesticides. This solution has a direct effect on the human body, and is used as a drink for improving health. These microorganisms also decompose pesticides and harmful substances in the soil almost totally within a few years.

In addition, they accelerate the solubility of phosphoric acid and insoluble inorganic nutrients in the soil, and improve water quality by reducing the size of clusters of water molecules. As a result, crop roots come to absorb inorganic nutrients selectively, and stop absorbing unnecessary elements and harmful substances, such as heavy metal. Thus, the quality of crops is greatly improved, and they can be food for truly preserving human health. Everything seems to go well with those microorganisms. This is because pollutants originating from organic matter are valuable food for these microorganisms, and their waste and metabolites are useful substances for higher animals and plants. Although the technology of applying these microorganisms started spreading only recently, it is steadily spreading in various places in the world, as is described in the brochure given to you.

3. Water pollution

Pollutants in the soil and the air eventually reach the water through rain and snow. Anyone knows that all forms of life are sustained by the various characters of water. Water, however, can be either medicine for all diseases or a cause of all diseases depending on the cluster structure of water molecules and the substances resolved in it.

The pollution of the sea, which collects pollution in underground water and rivers due to pesticides and chemical fertilizer, that is water sources due to the erosion of surface soil, and that in lakes and rivers and on the ground due to various harmful substances released from daily lives, including pollution by oil spilled in tanker accidents, is now becoming a serious problem. Fish farming is also a source of various forms of water pollution, including the excessive application of antibiotics to fish.

The fundamental solution to this problem is to prevent the pollution of the soil and the air. Most of such pollution can be prevented if we thoroughly carry out measures for preventing pollution caused by agriculture and those for preventing air pollution, which I will describe next. Polluted seashores and bottoms of the seas and lakes can be purified quickly by infecting useful microorganisms or by treating them with the microorganisms in high population. If these microorganisms are settled stably in the waste water tanks of toilets and sewage of houses and offices, and in those of factories processing agricultural and marine products, the waste water is purified for recycling, and rivers and lakes downstream and eventually the sea can be purified. This method does not require large facilities currently since no scum is produced. These microorganisms are also used for fish farming to spare antibiotics, and have been found to be effective for decomposing chemicals used.

4. Air pollution and acid rain

Pollutants in the air include various substances. They are sulfide and oxide emitted from automobiles, thermal power

plants, and factories as well as volcanoes; microorganisms and pollen; minute inorganic and organic particles; and foul odor substances produced as a result of the decomposition of organic substances. Since acid rain is mainly caused by sulfide and oxide, it is necessary to require that they are recovered at the sources of production.

Pollutants in the air fall to the ground, lakes, and rivers together with rain or snow. Since photosynthetic bacteria and anaerobic zymogenic microorganisms can feed on these substances, these microorganisms can be used to prevent the acidification of the ground, lakes, and ponds and also for fertilizing the soil effectively. It has been found that the air in the neighborhood of fields treated with useful microorganisms is much cleaner than the air in other areas, although its causal relation is not clarified yet.

Thus, various exhaust gases and polluted air can be purified considerably by allowing them to go through soil with a high population of useful microorganisms. Application experiments on this subject have been satisfactory. Needless to say, it is very effective for purifying the air to increase the amount of plants and trees in farmland and forests.

5. Pollution in animal and human intestines

It is said that most animal and human diseases occur if the microflora in their intestines is changed into the putrefactive type. The situation is similar for plants. If the microflora in the soil is changed into the putrefactive type, various physiological disturbances occur, eventually leading to the development of disease. Once disease is developed, the population of the microorganisms causing the disease rapidly increases, and they spread in the whole neighborhood area. If the microflora in the soil is healthy, the spreading of such microorganisms becomes minimal.

The control of intestinal microorganisms of human beings and animals has a similar meaning, and has a direct effect on the pollution of the air and water caused by microorganisms. If human beings or domestic animals take in the useful microorganisms I have described so far, the microflora in their intestines is drastically changed into a desirable type. As a result, a foul odor disappears from their waste matter, and they become healthier. Such waste matter with very little foul odor can be applied to farmland without causing the infestation of parasites and contagious diseases nor polluting the soil and water. It rather serves as good organic fertilizer, and contributes to the preservation of the environment. Since it can be said in a broader sense that human beings and domestic animals produce a considerable amount of pollution everyday, it is very important to reduce the amount of such pollution to a minimum level, while maintaining and promoting their health.

6. Desertification, the destruction of natural forests, the increase of carbon dioxide, and the damaging of the ozone layer

These are problems which were caused as a result of an increasing population and the vitalization of economic activities. It can be said, however, that the fundamental solution to these problems lie in the way agriculture is. They cannot be solved as long as conventional agriculture, which only deprives the soil of its energy, is continued. Thus, a fundamental transformation of agriculture is necessary. The production power of the soil can be increased up to a level a few times the present level if we do not use chemical fertilizer and pesticide, treat with microorganisms and use crop residue and waste matter produced in our daily lives, and diversify the microflora in the soil and change it into the reviving type.

By using microorganisms, we can also solve the problems of methane gas from paddy fields, which is said to be largely contributing to the damaging of the ozone layer, and those of various hydrocarbons produced by slash-and-burn farming and by burning organic matter, such as acetylene and ethylene. This is because we can totally stop the production of hydrocarbon, such as ethylene and methane, in paddy fields while fertilizing the soil by returning organic matter, without burning it, to the soil together with microorganisms, and by increasing the population of useful microorganisms in the paddy fields.

If the amount of agricultural production per unit area is increased a few times, the necessary area of farmland will be one third of the present area, the destruction of forests due to slash-and-burn farming and excessive pasturing will be

prevented, and the soil will become more resistant to various destructive forces. As a result, the problem of desertification will also be solved fundamentally. If this mechanism is widely realized, carbon dioxide, which is said to be most difficult to reduce, can be recovered as a source of food for an increasing population, and the area of forests can be expanded. While it is necessary to strongly promote the development of clean energy, such as solar energy, if we use farmland more efficiently and take various measures, for example, planting oil crops such as oil palms in residual farmland and using them as a source of energy, it will be possible to allow the earth to function as a self-contained, healthy large form of life.

Conclusion

I have briefly described various measures to solve the problems of environmental pollution. The important thing is to control microorganisms, which are minimum units of life, so that those of the reviving type become dominant benefiting higher living things, as shown in another material. Since there is too much pollution in the environment today, microorganisms of the destructive type will easily become dominant if nothing is done, and everything will proceed toward an undesirable direction.

The microorganisms I talked about can be easily multiplied in a large amount of solution with waste matter produced at agricultural or marine product factories. If they are cultured systematically, their production cost will be very low, and they can be applied widely: not only to farmland but also to forests and the wilderness.

Since these microorganisms form an integrated and complex system, they can coexist harmoniously with useful microorganisms already existing in the soil or water. Furthermore, most of them reduced, resulting in a larger amount of oxygen and a cleaner environment, they will stop multiplication, and either become dormant or die. Therefore, they will never become troublesome superpowers as result of excessive increase. While more than twenty years have passed since I started this research, no problem has occurred with the microorganisms. Although it is generally believed that it is difficult to settle artificially cultured microorganisms in the soil, it can be done easily if those of the reviving type are combined into a complex system.

To solve the problems of global environmental pollution, it is necessary to deeply learn the principle of the evolution of life, that is, the development of nature, and to carry out the obtained results systematically in a self-contained manner. Therefore, we have to be careful in selecting correct information.

Thank you very much.