

The Importance of Biological Research in the Pacific Region

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AT FIRST GLANCE The Importance of Biological Research in the Pacific Region seems such an obvious topic that anything one might write about it would be a truism. The world, including the Pacific, is dependent for its food supply on the products of several branches of applied biology. Large parts of industry depend for raw materials on applied biology. We all depend for cures for our ills and injuries on applied biology.

Before going on it may be well to define our terms. Biology is the field of science that deals with living things. Its scope runs from minute bacteria and even viruses to flowering plants and from the simplest one-celled animals to dinosaurs, elephants and man himself. It deals not only with the kinds, nature and physiology of organisms, but with their relationships to each other and to their non-living environments. Research is the attempt to learn new facts and to determine their significance in relation to what is already known. It is biological research, of course, when the facts learned are about living things.

Hence, agriculture, husbandry, fisheries, forestry, and medicine are branches of applied biology, and are only some of the branches that affect our daily lives. And biological research is the search for new knowledge bearing on these vital activities. Who could question the importance of this? In view of the facts that we do not have enough food for all the people, that raw materials are often scarce, that we still fall ill and die before our normal life span is over, it would seem obvious that biological research would be regarded as perhaps the most important of all activities, that the demand for it would be unlimited and the amount of research would only be limited by the supply of competent and willing research workers.

Curiously enough, this is not generally the case. What we know about agriculture, forestry, fisheries and other applied fields in biology is taken for granted. The research worker is commonly regarded as a strange man, perhaps a little mad. That there should be a reason to pay him a salary, or that he should need funds for his work, are hard for the politician who controls the spending of

public money to understand and harder for him to accept. And when the budget must be reduced, the first and easiest item to cut out is research. This may seem incredible and incomprehensible but is a phenomenon observed repeatedly. It may be worthwhile to seek an explanation for it.

Clearly basic to the problem must be a lack of awareness that all is not going as well as it could. The politicians and the influential people that control them are not the hungry ones. Their economic situation is such that they can buy food when they need it regardless of its scarcity. If they are users of raw materials, scarcities only show up, during peace-time, at least, as increases in costs which are simply passed on to the consumer in the form of increased prices. Deficiencies in medical knowledge, indeed, do become evident to even the most comfortably situated and influential politician or magnate, at least when he gets old. And it is significant that medical research is by far the best supported of the research activities of biology.

Perhaps the best way to approach the subject of the importance of biological research is to examine the general system in which we live, to see just what troubles that result from an insufficiency of biological knowledge might be corrected by research. If attention can be directed to these and some indication given of how biological research is pertinent toward remedying them the general question may be clarified.

The fact that people are inadequately nourished was mentioned above. It has been said that this is due to inadequate distribution rather than under-production. However, if distribution of food were really equalized, probably the well-fed among us would gain a slight knowledge of the pangs of hunger and the presently hungry would only be a little less so. And with this somewhat more adequate nourishment more of the presently starving would survive, susceptibility to disease would be less, and population would increase to where the food supply would be on the whole more inadequate than now. Research in agriculture, and in the various basic aspects of biology that are applied by agriculture, can contribute greatly toward the alleviation of current food shortages, also of shortages of raw materials produced by agriculture. Few in Malaya will have to be told of the part played by botanical research in the present prosperity of the area. The entire rubber industry in Malaya stems from the experimental introduction of the *Hevea* rubber tree into the Singapore Botanic Gardens where it was nurtured by the botanist Ridley. Research has been the constant accompaniment of every step in the development of this industry from the stage of gathering gum from the wild trees in Amazonia to the

highly efficient plantation culture in modern Malaya. One hundred fifty years ago *Hevea* was only a botanical curiosity. Palm oil, cane sugar, quinine, and pineapples are only a few of the plantation crops that are produced in a very efficient and economical manner today because of large investments in biological research.

Although medical research has changed the lives of people in the tropics from continual struggles with a host of parasites no one would pretend that we have reached the point where long healthy lives are to be assumed as normal. Tropical medicine and public health are more than ordinarily dependent on basic biological research because they lack the long background of research possessed by temperate medicine. We do not even know the complete ecology and life history of some of our serious parasites and disease vectors.

A few years ago there was a fairly widespread idea that synthetic chemistry had pretty well taken over the drug field—that plant products were interesting only as examples of primitive medicine, not to be compared with sulpha and other synthetic miracle drugs. Then came penicillin, cortisone, and reserpine and a sudden intensive preoccupation arose with a large number of obscure plants, from microscopic bacteria and fungi to forest trees. These plants occur in all parts of the world, but the tropical Pacific has more than a small share of them, because of the enormous flora of this tropical region. Research on medicinal plants is slow tedious work, and much of it never pays off, but the occasional important discovery much more than justifies the entire outlay in work and money. This is, of course, much more apparent to the sick man than to the healthy one. Few people who have been cured of pneumonia by antibiotics would doubt the wisdom of money spent on pharmaceutical microbiology.

One of the serious difficulties in tropical countries is the degradation of the soils. Originally it is probable that most tropical soils were in a state of equilibrium with the biological communities that occupied them. When man came into the picture this equilibrium tended to become more and more disturbed. As man's ability to affect this environment increased, through his development of implements and technology, his numbers grew. More strain was put on his environment as more demands arose for its productions. One only needs to look at the waste places on Singapore Island to see in aggravated form the results of this pressure on the resources of the soil. Degraded vegetation and exposed subsoil, capable of producing almost nothing of value are almost the rule here as in many thickly populated tropical areas. Although great steps have been made in preventing and alleviating such conditions in the temperate zone little has been done in this direction in the tropics.

This is primarily a biological problem, one of managing vegetation and soil biota, of working out wiser methods of using the soil, and more importantly, of managing or slowing down the growth of human populations. Intensive research in the biological fields basic to all of these activities is urgently needed, especially as environmental failure is cumulative.

A specter haunting agriculture, forestry, and all activities depending on plants is plant disease. Crop losses and landscape degradation from plant disease reach enormous proportions. In temperate areas vast amounts of research in plant pathology are required just to keep pace with the increasing ravages of plant diseases. In the tropics there are, at present, more diseases and less research. And as agriculture and forestry become more intensive, disease problems increase, rather than decrease. Monocultures provide ideal conditions for the spread of diseases. New strains of disease organisms come into existence and become established. The same can be said of insect pests. At the present level of research in plant pathology and entomology we can not hope to hold our own, especially in the tropics.

So far the discussion has concerned only areas where serious difficulties are to be corrected or averted. Examples of these could be multiplied indefinitely, especially by going more into particular cases. Of importance, also, are areas where improvements in already tolerable existing conditions may be brought about by research. We have palatable fruits and other food crops in our gardens and fields. This does not say, however, that they are the best possible. Plant breeding has in the past made the difference between the inferior, often almost inedible wild products, and the fine domestic varieties that we have. This was accomplished without much knowledge of the principles underlying the evolution of new kinds of plants. Now the science of genetics is an advanced discipline and future possibilities in plant breeding dwarf completely past accomplishments. In the past necessity guided the groping plant breeder. Now, knowledge of the possibilities should provide the stimulus and imagination can furnish the direction. The same can be said of breeding of other classes of economic plants and animals.

The ways in which man's environment can be influenced to make it more agreeable for him to live in are countless, and many of them depend on biological research. Most of them, unfortunately, will take the form of counteracting detrimental changes brought about by man's own activities. Man was well adapted to his primitive habitat. As he has changed this environment it has in many respects become more unsuitable for his occupancy. This does not

seem to be necessary but it has happened and is continuing in accelerated fashion. The advice of ecologists is vital to retarding or reversing this trend. This advice must be based on extensive research, most of which has not yet been done. If man is not to foul his nest so completely that it will eventually be uninhabitable he must understand his own relation to his environment. This will come about by properly oriented ecological research.

So far this discussion has been devoted strictly to matters that affect man's material needs, comfort, and well-being. These are important, but there is all too great a tendency to consider them to the exclusion of everything else. Traditionally, the peoples of tropical Asia have been able to strike a better balance between the material and the higher aspects of life than most others. With the impact of Western culture there is a tendency for the material side to receive more emphasis. This is not necessarily good. It entails a loss in some of the virtues inherent in some Asiatic cultures. Though science is generally thought of as strictly a materially oriented activity it is fortunately not completely so, either in its motivations or in the benefits it yields. One or two of the other facets may be examined to give us a truer picture of the place and importance of biological research in the present phase of the cultural history of the tropical Pacific region.

The greater part of the people of this part of the world belong to newly independent nations, after varying periods of colonialism. During the colonial period the cultural patterns changed, here as indeed in western Europe, from a mediaeval, essentially feudal state, more or less self-contained and in equilibrium with local environments, to modern membership in a highly integrated world community, completely dependent on the application of scientific knowledge and accomplishment for its normal functioning. A heroic, if somewhat frantic, effort is being made by these peoples to participate in the material and social benefits of modern scientific achievement and technology. This is regarded as an inherent right. Most of the science at present emanates from the western world, much of it from former (and present) colonial powers. The question has been asked if the newly independent peoples are really ready for full participation in the modern scientific world community, whether an essentially parasitic status, scientifically, is proper or justified. The question has even been asked whether the members of these non-western cultures are capable of scientific achievement equal to that of their western colleagues.

On the basis of actual quantity and quality of work done in these countries at the present time there is a certain amount of valid reason for these questions. Rather little work is done and much of

it does not measure up to the best produced elsewhere. However, those of us with experience in these countries and with personal acquaintance with indigenous scientists there mostly realize that present inferiority in output results from the cultural situation rather than from any inherent lack of ability among the scientists. In cultures where in the past there have been few opportunities for scientific work among the local people, poor educational facilities for them, and no scientific tradition, there is not likely to be immediate superior scientific accomplishment. If the intellectual climate is not right for it, and if no prestige is attached to it, science will not flourish. At the present time in southern Asian countries there are few scientists and these are smothered by administrative duties. This is especially true of biologists. It is obviously of the utmost importance to correct this situation, and clearly the way to do it is to emphasize, in every way possible, officially and privately, the importance of biological research. It is clearly essential to show the world that countries newly emerged from a dependent status are capable, both of attracting first-class foreign scientists and of eventually training local scientists who are the equals of those in other countries. This is to be done, obviously, not by creating scientists by official decree, but by placing such emphasis on research that young people with high intelligence and with scientific inclinations will be attracted into scientific careers and will realize the necessity of achieving training and standards equivalent to those prevalent abroad. This is a long-term project and crash programmes are not the answer. Rather, steady emphasis on research and well-directed support for it will bring about sound progress.

Finally, it must be pointed out that, important as are the practical, economic, and political benefits of biological and other scientific research, the fundamental importance of this, as well as other intellectual activities, lies in the development of the human mind and in the satisfaction of man's curiosity and his desire to understand his universe and his place in it. This is the motivation for all research beyond the solution of obvious immediate practical problems. The place of pure research as an intellectual activity and the strength of the urge toward understanding in a culture is perhaps the best measure of its degree of advancement in the scale of civilization.



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