

## EDUCATION FOR SURVIVAL AND A BETTER WORLD

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*Homo sapiens* differs from other animals in having a peculiar set of behavioral characteristics that can collectively be referred to as an aptitude for culture. This is to say, members of this species have a capacity for language (involving inventing and communicating with vocal symbols), and associated with this ability human populations have been able to accumulate considerable amounts of information (not necessarily always accurate), and to pass this information on from individual to individual, from group to group, and from generation to generation. Linked to this linguistic ability and with an unusual manual dexterity, this species has also developed, and passed on from generation to generation, a range of technologies which in earlier times were of general survival value to the species.



figure 1: Biohistory - Conceptual Model Version 1

However, this aptitude for culture has been something of a mixed blessing. In the evolutionary environment of mankind, it was undoubtedly of biological advantage and in that setting, it generally led to behaviours which can be described as 'biologically sensible'. However, when operating in habitats that differ significantly from those in which the human species evolved, this capacity for culture has often resulted in behaviours that are very far from a sensible, or desirable, from the human point of view.

Thus, on the one hand, our aptitude for culture over the millennia has produced beautiful buildings and works of art, a great deal of pleasing literature, verse, theater and music to be enjoyed at least by some sections of the population; and recently it has led to such biologically novel but relatively harmless sources of entertainment as watching football and tennis matches. And it has given us motor cars and airplanes, radio and television, as well as aspirin and antibiotics.

On the negative side, culture can be held responsible, among other things, for: most contagious diseases in history, including epidemics of cholera, the plague, smallpox and influenza; most malnutrition, including scurvy, rickets, beriberi and pellagra; gross social inequities; slavery; extreme poverty and appalling conditions of life for millions of city dwellers from the heyday of Rome to the slums of modern Karachi; the feeding of Christians to the lions and the bloody gladiatorial combats in Rome's Coliseum; countless deliberate massacres of innocent men, women and children; the virtual extinction of the Tasmanian aborigines; chronic suffering and distress in contemporary Beirut; high rates of cancer and heart disease and much loneliness and boredom in modern cities and suburbia; the gas chambers of World War II; the manufacture of weapons of mass destruction and the horror of Hiroshima and Nagasaki; the disappearance of many beautiful ecosystems the world over and the death of forests due to acid rain; the extinction of countless animal and plant species; the population explosion; the Chernobyl disaster; and the current threats to the viability of the biosphere as a living system capable of supporting humanity resulting from the discharge, on a massive scale, of the technological waste products of modern industrial society.

I will not attempt here a discussion on whether or not the advantages of the human aptitude for culture outweigh the disadvantages. However, it is necessary to emphasise that the great threats which exist at the present time to the biosphere and to the very survival of the human species are clearly culture-induced. Culture is also responsible for the obscene inequities in the conditions of life of different groups of human beings throughout the world.

These facts highlight an interesting and very significant paradox: while the extraordinary unsatisfactory aspects of the human situation on Earth are the consequences of the capacity for culture, it is only through our capacity for culture that we can hope to overcome that. It is only through the processes of cultural adaptation to culturally-induced threats that we can hope to redress, in time to avoid ecological collapse on a massive scale, the gross imbalances which exist in the human situation today.

Basically, the problem lies in the fact that, under the biologically novel conditions of civilisation (and unlike the case in the natural environment), no built-in mechanism exists to ensure that culture does not 'get out of control', and that it reflects, and is sensitive to, the needs of the living systems on which it and humanity depend. Indeed, no built-in mechanism exists to ensure that it does not in fact destroy these systems.

In fact, for easily understandable historical reasons, our contemporary culture (i.e. knowledge, understanding, world view, values, etc.) is in a state of dangerous imbalance, and does not reflect the realities of the human situation in the biosphere. This imbalance is in turn reflected in and perpetuated by the fragmented, compartmentalised, imbalanced and incomplete nature of our educational and research institutions. It is

little wonder that the policies and activities of so many human societies throughout the world are so grossly out of tune with the underlying processes of nature in the biosphere on which we all depend.

I suppose that the only hope lies in the possibility that humans will, through their aptitude for culture, come to appreciate the inadequacies of the cultural soup in which they are immersed. The hope for the future thus lies in the possibility that they will use their big brains that they are always talking about to examine the deficiencies in the prevailing cultural system, and to introduce deliberate and effective measures to overcome them.

The severity and urgency of the problem facing mankind today, therefore, demands immediate reform aimed at correcting these serious deficiencies in our institutions of learning, thereby helping to redress the imbalance in culture itself.

What form should this reform take? Here, I would like to argue strongly for the immediate development of a major theme in education and research which I shall refer to as bio-history. Others might call it human ecology, but I am not using this term simply because it seems to mean quite different things to different people.

The biohistorical framework has formed the basis of undergraduate programmes at the Australian National University (see below), and I have applied it in a study of Western civilisation. Recently, we have applied it at the national level in the preparation of a report on Australians and the Biosphere. In the early and mid 1970s, my colleagues and I used it in a study of the ecology of Hong Kong, and it forms the conceptual basis of an integrative project at present in progress in Bangkok.

I define bio-history as a coherent system of knowledge and field of study which reflects the broad sequence of happenings in the history of the biosphere and of civilisation, from the beginning of life to the present day (Figure 1). Its starting point is the history of life on earth, and the basic principles and facts of evolution, genetic inheritance, ecology and physiology. It is thus concerned at the outset with the sensitivities and diversity of living organisms and ecosystems, and with the interrelationships between different forms of life, and between them and the non-living components of the biosphere. Next, it turns to consider the evolutionary background, biology and innate sensitivities of the human species, and the emergence in evolution of the human aptitude for culture.

Bio-history then moves on to the study of the history of mankind, paying attention especially to the changing patterns of interplay between cultural and biological systems. Thus, it considers culture-nature interplay in the long hunter-gatherer phase of human existence, and then in the early farming economies that emerged around 400 generations ago. Next, it deals with the highly significant biosocial changes that came about when urbanisation began some 200-250 generations ago involving, for example, relatively permanent stratification and differentiation within societies with respect to conditions of human life, health and disease patterns, material wealth and power, and the institutionalisation of violent combat between human populations. Patterns of culture-nature interplay are an overriding theme in bio-history.

Finally, biohistory turns to the modern high-energy phase of human history. It considers the patterns of resource and energy use and of waste production in contemporary societies, the interrelationships between human populations and the ecosystems of the biosphere and the biosocial disparities and differentials that exist between the different human populations and sub-populations in today's world.

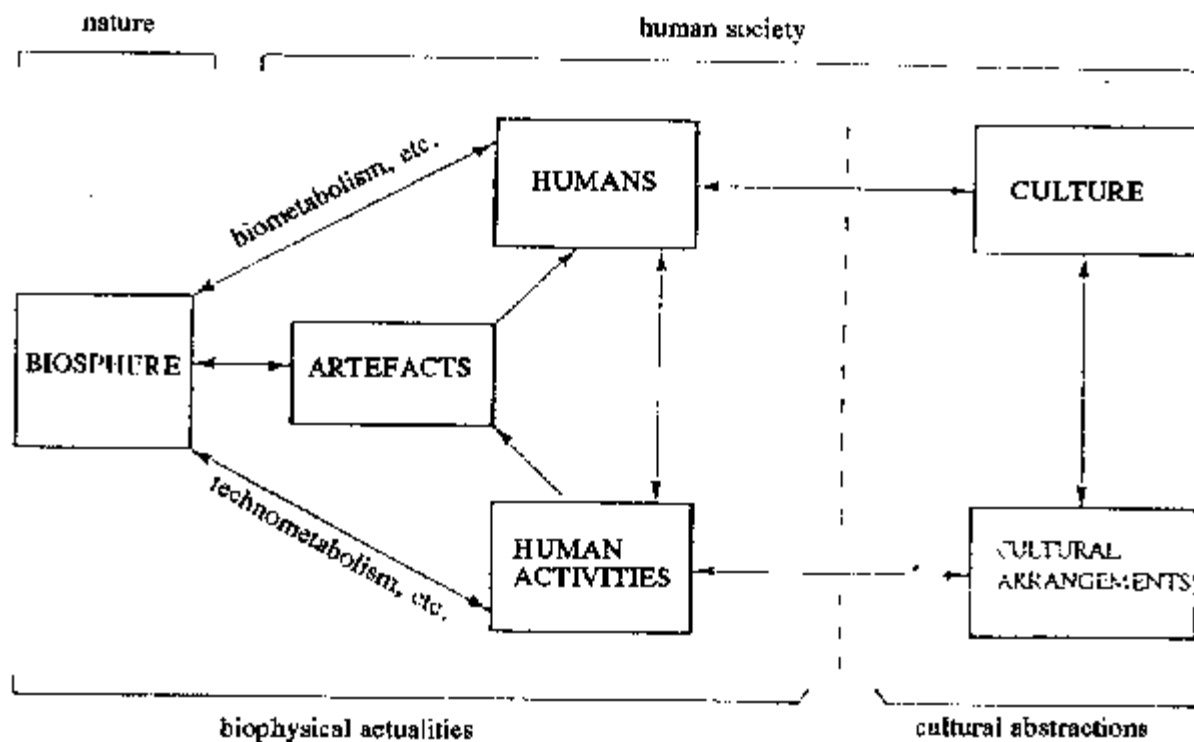


figure 2: Biohistory - Conceptual Model Version 2

Figure 2 is a slightly more complex version of the model shown in Figure 1 which draws attention to some additional features of the biohistorical approach. Thus, it includes a set of variables referred to as cultural arrangements, which are regarded as an aspect of abstract culture. They include, for example, social hierarchies, institutions, and other aspects of social organisation, the economic system and legislation.

Especially important among the consequences of human culture, from the standpoint both of the ecosystems of the biosphere and of human experience, are various human artefacts which include, for example, all tools, ornaments, machines, works of art, buildings and roads.

At least as important ecologically is the fact that the human aptitude for culture introduced a new dimension to the metabolism of human populations. Thus, in addition to biometabolism, which is the sum total of the inputs and outputs of organic material and energy that flow through human organisms themselves, human society is characterised by technometabolism—that is the inputs and outputs of materials and energy that result from technological processes. This includes, for example, the inputs of minerals and fuels and the outputs of waste substances (as well as the intended products of human activities, or artefacts). The most important components within the different sets of variables are depicted in Figure 2.

It is necessary to draw attention to the important distinction in this model between biophysical actualities and cultural abstractions. Cultural abstractions are those abstract aspects of human situations consisting of culture itself, including beliefs, assumptions, attitudes and values, and cultural arrangements, such as the economic system, political organisation and institutional structures. Biophysical actualities embraces all other aspects of the system, including ecosystems and organisms of the biosphere, human artefacts and humans themselves (e.g. demographic variables, geographic distribution, occupations, health and disease, etc.) and their activities. Biophysical actualities are conventionally studied by various kinds of natural scientists, and cultural abstractions by students of the humanities and social sciences.

Clearly, there are very important links between cultural abstractions and biophysical actualities. For example, the value system of a society has important connections with the economic and political arrangements, and these in turn influence human activities and the impacts of human populations on the biosphere. Appreciation of the distinction between these two aspects of human situations is an important aspect of the conceptual approach, and is useful in our efforts to understand the dynamic interrelationships between natural and cultural processes.

Bio-history is concerned not only with unravelling and describing significant interrelationships in human ecosystems between cultural and biophysical variables, but also with the identification of fundamental principles that help us to understand the nature of the constraints imposed on human society by virtue of its dependence on biological systems and processes. Some of these principles derive directly from the biophysical and social sciences, and these include principles relating to thermodynamics, biogeochemical cycles, soil ecology, natural selection, physiology, health and disease, alienation, anomie and corporate behavior. Others derive from bio-history itself and specifically concern the interplay between biophysical and cultural processes. These include principles relating to: the impacts of cultural processes on the health of humans and of ecosystems; the biological consequences of the human aptitude for culture expressed in unnatural environments; somatic and extrasomatic energy flows; biometabolism and technometabolism; the four ecological phases of human existence;

technoaddiction. These principles are of the greatest significance for the understanding of human affairs at all levels of organisation and to our choice of societal options for the future.

Another important aspect of bio-history is the study of adaptive processes, biological and cultural, that come into play when societal activities have impacts on biological systems which are disadvantageous, or which are perceived to be disadvantageous to mankind. It pays attention especially to the processes of cultural adaptation that may be brought into action in response to culturally-induced threats to human survival and well-being. Such cultural adaptive responses have been very important in human history; and whether or not humankind survives the next century will depend on the extent to which they are successful in the near future.

It is clear, of course, that a good deal of information pertaining to aspects of bio-history is already presented in educational programs in zoology, botany, chemistry, physics, biochemistry, meteorology, geology, geography, human biology, environmental science, human physiology, psychology, health studies, sociology, history, prehistory, archaeology and so forth.

However, as an integrated and coherent subject in its own right, aimed at improving the understanding of human situations in terms of the interactions between biological and cultural aspects of reality, and of the biology of the human species, and of the place of mankind in the natural world, bio-history does not feature as a part of the learning experience of the great majority of people in any human society the world over. It is true that there are some individuals in our midst who do have a biohistorical understanding of human situations, but when this happens it is not the consequence of enlightened programs of education, but rather the result of fortuitous encounters with relevant pieces of knowledge - combined, perhaps, with a certain intuition.

The arguments for including a major biohistorical input into the educational process are simple and rather obvious. They follow from three inescapable and closely related aspects of reality:

- A. Human beings are totally dependent, for their sustenance, their health and well-being and their enjoyment of life, on the underlying set of biological systems and processes which operate in the biosphere, in its ecosystems and in their own bodies. Dependence on these underlying processes is very basic. All products of culture—our institutions, ideas, knowledge, machines, computers, high technology, military strength, politics and economics—all these count for nothing if the societal system of which they are all a part does not satisfy the biologically-determined health needs of the biosphere and of our own bodies.
- B. Every human situation, at the level of individuals, small groups or whole societies, involves continual interplay between biological and cultural elements, and the outcome of this interplay is often very important for human health and well-being or for the ecosystems on which we depend.
- C. Human culture has influenced, and now increasingly influences, the biological processes on which we depend and of which we are a part. From the anthropocentric point of view, some of these influences may be seen as good and desirable, others as bad and undesirable; and some of them even threaten the survival of the human species.

In light of these facts, it stands to reason that some understanding of human situations in biohistorical perspective, of fundamental ecological and biosocial principles, and of the potential and limitations of the various adaptive processes available to mankind, is a prerequisite for sensible behaviour, individual and collective, in the complex world of the late twentieth century.

General educational programs in bio-history would not deal with particular issues in great detail, but would rather introduce students to the biohistorical perspective and to essential facts and principles relevant to the human situation in the biosphere. They would, however, offer ample scope for the in-depth treatment of particular themes of local or topical interest. Thus, for example, such topics as health in cities, local conservation strategies, international cooperation and the greenhouse effect, war and peace, and the occupational structure of society all lead themselves to in-depth, integrative biohistorical analysis. Indeed there is a place for educational programmes in economics, politics, sociology, political economy and other social sciences in which these subjects are treated in terms of the conceptual framework of bio-history.

While the emphasis in this paper is on bio-history as an educational theme, it also provides a rational framework for integrative research on human situations, all of which involve continual interplay between cultural and biophysical processes, and all of which are the product of such interplay in the past. There are, for example, important linkages between the cultural assumptions and value systems of a society, its economic arrangements and its patterns of use of resources and energy, and all of these have a powerful influence on the behavior, time budgets and health and well-being of people, as well as on the characteristics of local, regional and now even global ecosystems. An improved understanding of these interrelationships is a prerequisite for wise policy formulation and decision-making at all levels of societal endeavour.

On a more philosophical level, bio-history is more pertinent than any other system of knowledge to certain recurring questions of profound significance for humanity. At the level of society, these questions include, for example: Where do we come from? How did we get here? Where do we seem to be going? Where do we want to go? At the level of the individual, they include: Who am I? How did I get here? What kind of life am I leading? What kind of life do I want to lead? What kind of life would I like my family, friends and descendants to lead? I suggest that a significant biohistorical input into learning experience would help people to come nearer to finding meaningful answers to these questions.

Bio-history cannot be classified as belonging to the natural sciences, social sciences or the humanities. It is about the real world in the sense that it is concerned with the patterns of interplay in human situations between the various aspects of the total system that are traditionally studied separately in these three different academic arenas. The recommendations presented in this paper are based on the view that a better understanding of these patterns of interplay is of paramount importance if we humans are to create a better world and, at the same time, overcome the culturally-induced threats inherent in the present situation.

Bio-history formed the basis of the Human Sciences Programme when it was introduced at the Australian National University in 1972. This is a three-year programme for undergraduates that can be taken as a major by students in any one of the faculties in the university. Although the programme was introduced in the face of considerable opposition from the various areas of academic specialisation, and there have been numerous attempts over the years to eliminate it, it still exists, and is probably now stronger than it has been for many years. Nevertheless, the programme is attended by little more than one percent of the students at the university. In my view, educational programmes aimed at improving the understanding of the human situation, and of specific human situations, in biohistorical perspective should be part of the learning experience of students at all levels in the educational system, whatever their areas of vocational or academic specialisation.

Bio-history deals with the common heritage and common dependencies of all humankind. It is, perhaps, the one and only theme which should be incorporated in all educational programs in all human communities in all parts of the planet. And, apart from its value to society for the important reasons already discussed, it is also an extraordinarily interesting subject in its own right-and, as such, it has the potential to be a source of continuing enjoyment for students of human affairs of all ages the world over.

### References

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4. Boyden, S., Millar, S., Newcombe, K., O'Neill, B., (1981) *The Ecology of a City and its People: The Case of Hong Kong*. Australian National University Press, Canberra.
5. This study is entitled *Impacts of Modernisation and Urbanisation in Bangkok: An Integrative Ecological and Biosocial Study*. It is a joint project involving Mahidol University (Dr. Apichat Chamrathirong and colleagues), Chulalongkorn University (Dr. Suwattana Thadaniti and colleagues) and the Centre for Resource and Environmental Studies, Australian National University (Dr. Helen Ross, Mr. Anuchat Pongsomlee and myself).
6. The processes of cultural adaptation to culturally-induced threats to biological systems are discussed in Boyden, 1987.
7. The Human Sciences Programme at the Australian National University, Canberra, is now under the leadership of Dr. Ian Hughes.

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