Back to Basics and Biology

David H. Ost
California State College
Bakersfield 93309

During the past decade teachers of biology have moved away from emphasizing content purity for the introductory student. Instead the structure of biological inquiry and the application of the underlying conceptual schemes, such as evolution and ecology, to the understanding of change have become paramount. By studying biology, students can learn much about the potential for changing the human condition and cultural institutions.

Biology can play a unique role in the general education of students. The scientific method, which is integral to biology as well as the other sciences, is one means of inventing the future. In addition, the models available provide mechanisms for testing alternatives. The models not only explain phenomena, but can also be used to identify new modes of action for the individual as well as for all elements within the culture (Ost 1976).

In the past several years, scientists have carefully considered the issue of social responsibility for their disciplines. The recent concern about DNA research clearly illustrates this. Similarly, authors such as Roszak (1971; 1972) argue that antipathy to science, rather than simply antipathy to the consequences of technology is the real issue. Science is a cultural tool; knowledge of its use and power is essential to the survival of human culture.

The bulk of scientific understanding of reality is a result of physical science models similar to common sense. Wren-Lewis (1974) suggests that nearly all of the knowledge is developed within such a paradigm. These models employ short units of time and other variables that are readily manipulated. Students and citizens tend to view the world as compounded of forces, substances, and objects to be manipulated or accepted without question. The expansion of power and the exploitation of the environment are as much a result of the way reality is manipulated as they are efforts to satisfy psychological, economic, or physiological needs. To one who is not familiar with the interrelationships of factors on a large scale over an extended time period, questions concerning nuclear power plants, drilling for oil off-shore, and the SST, are posed only in terms of immediate needs and present demands. As people become more aware of biological models and the dynamics of living, rather then merely physical, systems, questions are more and more frequently being raised about the need for bigger power sources, unchecked production systems, and pollutant-producing vehicles.

The inadequacy of the physical science models for use in social and living systems has been recognized, and attempts are being made to shift patterns of thinking. In his book, *Biopolitics*, Thorson makes a strong case for adopting an evolutionary model as a paradigm for political science (1970). He even goes so far as to suggest a concept of "cultural DNA." In economics, interrelationships have long been recognized although not fully understood; changes in the economy still cannot be predicted or controlled. The idea of diversification, analogous to the concept of a gene pool, is common among large conglomerates as a hedge against unforeseen changes. E. F. Schumacher has extended the concept in his book *Small is Beautiful: Economics as if People Mattered* (1973), when he argues that by employing traditional models common to physical sciences, economists "always tend to try and cure a disease by intensifying causes." He makes a strong case for lesser technologies that have reduced economic efficiency but have increased the quality of life through wiser use of human resources. The human resource pool, like the gene pool, is systematically being strengthened and maintained in response to change.

Biology has unique strengths that educators have yet to fully tap, for to teach students that biological models are dynamic is to provide them with a mechanism for dealing with the future. Traditionally, the biology curriculum, as with most curricula, has been designed to present knowledge generated in the present and the past. Such an historical framework orients students to the present and the past. Physicist G. I. Whitrow (1961) suggests that "the evidence is compelling that the missing link between psychological and physiological aspects. . .(of) identity should not be sought in some hypothetical higher space, but rather in the dimension of time." To develop what Singer (1974) terms a future-focused role image requires a future-oriented perspective. This future-oriented perspective is not

simply gaining a knowledge of predictive models that stress cause and effect, but also is an ability to understand and to think based on a concept of time.

Perhaps concern for the future can only be fostered when the concept of time is related to and through living systems such as those found in the biological and earth sciences. Young people generally learn to satisfy their needs immediately. "Buy now and pay later" is today's standard. Television emphasizes the importance of immediate gratification. Where does a student learn to delay a gratification for a greater period of time and for perhaps greater benefit? Where in the educational system is the importance of long-range planning being emphasized?

Instead of reacting to problems according to the quick profit principle, properly educated citizens will be better equipped to anticipate and perhaps *control* the future. If the futurist outlook had been substituted for the technological mentality of past generations, perhaps our economy would not now be based on the automobile and its service industries. Perhaps if biological models had been used as the basis for future health planning, we might have sophisticated programs of preventive medicine rather than the expensive remedial medical programs that are consuming an increasingly larger percentage of individual and national resources.

Why is biology basic? There is no single answer, but it is likely that an understanding of living systems affects the role image of the individual. Similarly, an awareness of biological models that have time parameters of greater magnitude than an individual life span may help citizens create roles that are more oriented to their future well-being. A knowledge of the interrelationships of factors may help individuals to think more creatively about how to solve complex problems. And, such a new style of thinking may help to develop the capacity to act to prevent problems rather than simply to react to them.

References

OST, D. H. 1976. Science and cultural values. *The American Biology Teacher* 38(6):277.

ROSZAK. T. 1971. *The making of a counter culture*. New York: Doubleday and Company.

_____. 1972. *Where the wasteland ends*. New York: Doubleday and Company.

SCHUMACHER, E. F. 1973. *Small is beautiful: economics as if people mattered*. New York: Harper and Row, Publishers.

SINGER, B. 1974. The future focused role-image, in A. Toffler, ed., *Learning for tomorrow: the role of the future in education*. New York: Vintage Books.

THORSON, T. L. 1970. *Biopolitics*. New York: Holt, Rinehart and Winston.

WHITROW, G. I. 1961. *The natural philosophy of time*. New York: Harper Torchbooks.

WREN-LEWIS, J. 1974. Educating scientists for tomorrow, in A. Toffler, ed., *Learning for tomorrow: the role of the future in education*. New York: Vintage Books.