

Biology and Society: A Curriculum Proposal

By WARREN P. VON BLUM

Forty years ago, in a series of lectures before students and faculty at the University of Madrid, José Ortega y Gasset bemoaned the inadequacies and deficiencies of higher education. He noted with dismay that specialization and fragmentation of human knowledge in the university gave rise to a situation wherein most graduates could not reasonably call themselves educated men and women. Rather, the end product of a university education tended to be, with lamentable frequency, a barbarian knowing much (or not so much) of one thing and virtually nothing about the complex and exciting relationships of the various fields of knowledge.

Regrettably, the situation has not noticeably improved, and a candid appraisal of the situation today reveals that further deterioration is likely. Ortega y Gasset's call for a new integration of knowledge has become a cliché instead of a fact; when one pierces the veil of the rhetoric, one finds, unfortunately, a far grimmer reality. In the American university there are still thousands of humanities students who recoil in horror from their required science courses or, often as a consequence of the inadequacies of many of these courses, from science itself. Similarly, there are thousands of science students who, neglecting the intellectual foundations of science in general, tend to learn and master merely the content of a science. All too often these students display an astonishing lack of patience for the worth and value of the nonscientific disciplines. A science-oriented society requires a generally educated citizenry sympathetic to and knowledgeable about the purposes

and methods of science. Tragically, far too many university students, both from within and outside the sciences, fall far short of this objective. The reasons are complex, and if the university is to reassert its cardinal function of enlightenment, massive change is required on all levels. Certain institutional changes may help considerably, however, and it seems an eminently worthwhile task to explore some of these possibilities.

Biology as a Central Discipline

Biology, perhaps more than any other science, is in a unique position to bridge an important educational gap. My own experience as a university teacher convinces me that one significant dimension of the integration and synthesis of knowledge—a precondition for genuine liberal education—can be served through an analysis of subjects that, in a broad sense, are biologic in nature. Aggression, pollution, the population explosion, and evolution are all biologically based, yet each has important implications for other fields of knowledge and, in fact, cannot be fully understood in a biologic context alone. It is time to initiate courses throughout the university that will specifically deal with knowledge in its broader context. Several courses could in theory be established as bases to halt the frequently pernicious influence of educational fragmentation. It is time, then, for biology to maximize its unique position in this regard. To view the fundamental themes of organic life in its social and philosophic framework would have obvious and considerable educational benefits, to faculty as well as to students.

A course I would call "Biology and Society" should be made available to liberal arts students and to prospective professionals in biology and associated

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fields. The course could simultaneously serve the educational needs of pre-med majors as well as English majors, biology as well as sociology majors. The relationships between biology and society are immense, and quite obviously a large number of subjects could meaningfully be examined during the course; my proposal, in its substantive details, is therefore merely suggestive of the kind of approach that would begin to address itself to the problems I have mentioned. Any such class purporting to be genuinely interdisciplinary must surely be sufficiently flexible to permit the introduction and examination of a variety of subjects broadly related to biology. My own suggestions as to topics stem from several years of college and university teaching experience; they are topics that have proved intellectually exciting and educationally valuable to science and non-science students alike.

Specifically, I propose that a Biology and Society course (or courses) should include a study of scientific method and its intellectual foundations; evolution and its implications; the nature and origin of aggression; and problems of population and environment. I distinguish these subjects, obviously, only for analytic purposes; in actuality they are intricately related, and an important function of this course would be as thorough and systematic an examination of their relationships as is pedagogically practicable.

Implications of Scientific Method

The first subject worthy of serious inquiry should be the nature of the scientific method, especially as it is applicable to biology. In proposing this as the base topic, I mean of course to seriously transcend the traditional lip-service paid to this subject. Most introductory biology textbooks, for example, begin with a *pro forma* discussion of scientific method. For the most part, these efforts are little more than ritual incantations, appropriately uplifting but often appallingly deficient in intellectual rigor and substance. I propose instead a more comprehensive analysis of the intellectual foundations of science, so that an earlier or subsequent discussion of biologic content and vocabulary will be underpinned with a valuable epistemologic foundation. The study of scientific method, therefore, should include, broadly, a discussion of the philosophy of science in general and the philosophy of biology in particular. Science should be viewed as a mode of inquiry centering on the formation of logical constructs for the interpretation of natural phenomena rather than as a statement of irrevocable empiric truths. For example, these discussions can lead to a fruitful examination of the nature of scientific classification. This process, regrettably, is all too often taken for granted. Why categories are established and, derivatively, why certain things fall into one category rather than another—these are questions that give rise to an entire spectrum of important intellectual issues. They are decidedly worth rigorous exploration.

Other substantive topics derive from these con-

siderations. A study of the intellectual foundations of science can lead to discussions about the relationships of biology to other fields of study, including the physical sciences, the social sciences, and the humanities. Finally, a general awareness of these relationships should lead to some very relevant ethical considerations. As biologists and other scientists become aware of their role in society and of the relation of their endeavors to those of workers in different fields, the question of social responsibility clearly arises. What the social responsibilities of the scientist should be has become a matter of paramount importance today, especially in view of recent history and the phenomenal development of technology. In the most basic way, this issue fundamentally affects the future course and character of human life. It, too, is eminently worth rigorous exploration. Tragically, it is all too often simply ignored.

Evolution and Man's View of Himself

The second major topic would involve a substantial examination of organic evolution and its implications. Darwinian theory has profoundly affected not only biology but the entire intellectual outlook of modern man. As important as evolution is, it is often given cursory or marginal treatment in biology courses and often no treatment whatever in history, philosophy, or sociology courses. Consequently it is important to place the theory of evolution in the context of the history of ideas in general. Darwinism has had a major impact on theories of society, philosophy, psychology, and theology. These relationships should be explored in depth. The relationships here are complex, and they raise scores of subsidiary and intellectually valuable issues for discussion. For example, this exploration could give rise to a discussion of the use and misuse of Darwinism in the social realm; of the role of religious belief in the light of evolution; even of the political and other implications of a Scopes-style confrontation. Clearly, the range of selection of topics in this realm is considerable, and pedagogic convenience should be the operating premise.

The study of evolution, moreover, encourages a consideration of man as a product of the evolutionary process. Man can be viewed in the context of this process, and an examination of the comparative study of animals may well ensue. This matter has considerable significance today, in light of the propensity of some students to overestimate its importance and the propensity of others to negate it entirely. Precisely what we can and cannot learn about man from the study of the lower animals is a genuinely valuable realm of inquiry and investigation.

Finally, a study of organic evolution in a course of social biology might consider the implications of heredity. This topic is, to be sure, rather broad, but it lends itself to a review of several issues of social, political, and ethical importance. Eugenics, for example, is associated with the domain of heredity, and the topic should be discussed within its biologic as

well as its ethical and political perspective. Similarly, the problem of sterilization has long been a matter of controversy and investigation. It, too, would benefit from a rational examination—one that draws aside the ideologic veil of the special pleaders. Finally, the question and dilemma of race has long been associated with heredity. The findings of biology are exceedingly pertinent here; they demand our attention. For example, the controversy over the alleged relationships between race and intelligence deserves the attention of the academic community, without regard to the sensitive nature of the subject or the possibility of deriving results or conclusions that may prove unpleasant or unnerving to special-interest groups.

Aspects of Aggression

The third major unit of the course in Biology and Society would, conceivably, entail a thorough analysis of the phenomenon of aggression. This question has provoked considerable controversy in the intellectual world. In my own teaching I have found this topic to be the source of massive speculation—some highly creative, some ill-informed and simplistic. I have encountered students who maintain that aggressive behavior is a biologic phenomenon and others who maintain that aggression is solely a function of environmental and cultural conditions and institutions. The entire problem of the relationships between genetics and environment is therefore raised by the pedagogically interesting topic of aggression. The underlying factors should be explored as closely as possible. Precisely how much of aggression, if any, is biologic and how much is environmental will always be subject to substantial doubt, but the function of the course should be to delineate the components with as much hard evidence and rational inference as possible.

The topic of aggression leads also to other important issues of general academic concern. Problems of war and peace and territoriality and international organization derive from considerations of human aggression. Whether particular proposals for peace and cooperation are, in fact, practical or merely hopelessly utopian turns in substantial part on whether aggression is biologic and how much of it can be overcome or sublimated. Without offering any conclusions in this paper, I do submit that these questions deserve far more comprehensive analytical and factual attention than they now receive in colleges and universities in America.

Aggression, finally, is an important focal point for an examination of the relationships between biology and psychology. For ages, philosophers, artists, literary figures, and psychologists have speculated on the basic or ultimate nature of man. Some—Machiavelli, Hobbes, Dostoevsky, Nietzsche, and Freud, among others—have argued that man is inherently vile and that even an optimum set of political, social, and economic circumstances will, at best, only marginally affect the basic thrust of hu-

man nature. Others—the social philosopher Rousseau, the anthropologist Montague, and some of the Freudian revisionist psychologists—assert that man's nature is fundamentally good and that human beings have a large reservoir of ability, creativity, and sensitivity if these are properly cultivated. Since a view of human nature—particularly of its aggressive component—underlies so much of intellectual theory and, more personally, one's entire *Weltanschauung*, this subject, too, deserves the attention of a class in social biology.

Population and Environment

The final suggested unit of study concerns the dilemmas of population and environment. Pollution and population growth are essentially biologic problems that have received increasing public attention in the light of an ecology boom in the mass media, in the rhetoric of men and women seeking elective office, and among students who seek outlets for their idealistic impulses. The parade of horrors today has been brought to the attention of many millions; virtually all are aware of the ecologic disasters that may befall or have already befallen us. Though the motives of some who call these issues to public attention may seem somewhat questionable, important and positive educational innovations have ensued as a consequence of this public exposure. Issues such as birth control, population theory, and air, noise, and water pollution have received substantial attention in university classes taught in departments of biology, geography, anthropology, sociology, and economics; in fact, ecology classes have been started, and in some colleges and universities entire programs have been instituted. This tendency should be encouraged. Under these circumstances, this unit may be considered optional for a class in Biology and Society. Assuredly it is unusually relevant to such a course, but its inclusion might depend on the coverage these subjects are given in other classes or programs in the particular college or university. In any event, a thorough examination of the pollution problem in America, whether taught as a unit in a social-biology class or under other institutional arrangements, should include a perspective on the role and nature of corporate power in this country and the widespread public acceptance of this power as a consequence of the pervasive ideology of private property. It is abundantly apparent that these issues, too, are vitally important for the quality of future human life as well as an exceedingly fruitful ground for significant intellectual synthesis and integration.

Scope for the Creative Teacher

It is important, in conclusion, to reiterate that my proposed topical units and their derivative issues are merely suggestive, and that alternative topics and organizational devices are equally possible and

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class meetings in varied patterns. This has enabled the teaching team to include in the course a number of outside speakers and several field trips. Speakers have been used to present divergent viewpoints on a topic; for example, a biologist spoke on populations, a priest on birth control, and a social worker on planned parenthood. Discussions are based largely on current materials gleaned from newspapers, magazines, and television programs.

Both teachers are present at all class meetings; this promotes the exploration of varied points of view. Differences between the two members of the teaching team do develop, Van Gorp reports; but, he continues, "Both members of the team contribute to the class discussions and program. Students must have the benefit of this experience to fully understand the problems of today. Our team differences are constructive."

At Lansdowne High School, in a suburb of Baltimore, Md., Benjamin Poscover, biology teacher, and Thomas Fort, social-studies teacher, working as a team, have also developed a one-semester course, which they call "Society-Environment-Science." As in the Cherry Creek course, students are drawn from the 11th and 12th grades and have had courses in general biology and in world history.

The Lansdowne course is taught within the framework of conventional school scheduling. The class is divided into committees, which have responsibilities for working up presentations on such topics as air, water, population, and commercial activities. These presentations are developed not only from secondary sources, such as films, books, and magazines, but also from field experiences, laboratory investigations, and interviews with persons in the community. The aim is to create student awareness of the social implications of biologic matters that deal with the numbers of people, the needs of people, the interrelationships of people, and the expectations of people.

At both Cherry Creek and Lansdowne the courses are reported to be going well. Student interest and participation are high, though Van Gorp reports that students when ranging beyond the classroom "have run into frustrations and find the public quite apathetic to the environmental problem."

Because of their similarities, Cherry Creek and Lansdowne form a very biased sample of the 15 schools; but any assessment is premature. In the early summer of 1971 the 30 teachers will reconvene at Boulder to report their experience, to evaluate the project, and to make recommendations for possible future endeavors.

Opportunities and Responsibilities

Whatever may be the outcome of the BSCS un-

dertaking I have here described, there will undoubtedly be in the 1970s many similar undertakings. Environmental problems are not going to fade away. People of high school age will continue to be interested in these problems, the more so as they come to realize that all other social problems are corollary to them. Teachers will continue to seize the educational opportunities presented by this student interest. To me as an educator, the primary concern is this: that the scientist maintain his credibility as a scientist, that the humanist maintain his guardianship of culture and civility, and that both, true to their respective traditions, preserve in the midst of turmoil, faith in human rationality.

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desirable. This is largely a matter of pedagogic convenience. My primary aim in this paper is to stimulate educators to initiate courses and programs calculated to deal with a range of educational deficiencies. I am aware that a proposal for a course that seeks to transcend narrow disciplinary barriers remains in the realm of the abstract, regardless of whether it is a course in social biology or philosophic psychology or political economy.

Perhaps more important is the selection of highly creative teachers to staff such courses. More than ever before, we are in need of men and women who themselves are knowledgeable not only in their professional specialties but in a wide range of intellectual disciplines. We need (as Ortega y Gasset so wisely noted) professors who possess a remarkable talent for synthesis and integration. And we can hope that they will also possess the gift of creative teaching. The time has come for some unpleasant honesty: we do not now encourage or reward good and conscientious college and university teaching, and our rhetoric to the contrary all too often smacks of hypocrisy. These are the men and women who can make a course in Biology and Society a valuable addition to the university curriculum—teachers who can simultaneously impart valuable intellectual content as well as promote intellectual curiosity and the development of critical and analytic abilities. There are always highly creative students—whatever their primary interest or competence—who will pursue their curiosity into other realms of knowledge in their quest to become genuinely educated, cultivated, and sensitive persons. A major task of the university should be to institutionalize arrangements that will facilitate this endeavor.