

# Toward Improvement of Advanced Undergraduate Biology Courses

JOHN A. BEHNKE, Chairman

Subcommittee on Instructional Materials and Publications  
Committee on Educational Policies

Many biologists have noted that college courses and textbooks often fail to keep pace with advances in the biosciences. What causes concern is not that discoveries inevitably somewhat outdate any book before it can be printed, nor the omission of specific research results. Rather, what is serious is the inertia impeding the redirection of instruction in accord with fundamental changes in many fields during recent decades. Courses may also have inadequate regard for changing student needs; students must be prepared for the biology of 1970 and 1980, not that of 1900 or even 1950. Obviously, the complexity and amount of information in any field dictate severe selectivity in designing courses. It matters greatly how that selection is made if the student, in the limited compass of a course, is to be given a foundation that will serve well for the future. But tradition and the fact that a college professor may be asked to teach subjects in which he is not expert often lead to the persistence of more or less anachronistic patterns of teaching.

The Committee on Educational Policies of the Biology Council, Division of Biology and Agriculture, National Academy of Sciences—National Research Council, has proposed a method for meeting this situation. The plan can be applied to any field by any responsible and informed group. The Committee itself, aided by a grant from the National Science Foundation, will test the plan in two subjects. If trial indicates that the approach is sound, the Committee hopes that the demonstration will encourage professional societies and others concerned with particular subjects to sponsor similar studies.

Basically, the idea adapts the research conference technique to the development of courses, recognizing that, even in a limited field, one person's knowledge and wisdom

rarely suffice. For a subject considered by those in the field to need scrutiny, an *ad hoc* panel would be set up, composed of biologists who represent different facets of the discipline and whose competence in research, experience in teaching, and flexibility of thought are generally recognized. The panel would make a wholly fresh start in designing the course, putting present practices aside in so far as possible. It would first consider what function the course should serve, what understanding and information students who take the course—or might do so if it were properly developed—need. This question should not be interpreted as stressing applications alone; undergraduate courses should primarily contribute to the student's maturation as a biologist through emphasis on broad comprehension of principles. Keeping these objectives and the present state of our knowledge in mind, the panel would then define topics to be included and the place and weight assigned to each, noting what time-worn material may be eliminated, what sequential treatment will most effectively impart a coherent picture of the subject as an area of systematic knowledge and, especially, as a sphere for continuing inquiry. Through correspondence and meetings, the panel would exchange ideas and tentative outlines until they evolve an acceptable, fairly detailed program, perhaps with suggestions for variations. Finally, the panel would publish its report, exposing it to professional criticism and making it available for the guidance of teachers and authors. The panel would then disband, for the objective is not to replace one orthodoxy by another, but rather to initiate what should become a continuing process of periodic re-evaluation of courses.

The trial involves panels on Parasitism and Systematic Botany. After considering many

suggestions from a variety of sources, including the American Society of Parasitologists and the American Society of Plant Taxonomists, panel members were selected by the Committee and appointed by the Chairman of the Division. The panels are now at work; reports due by June 30, 1957 will be published in journals or through the Academy-Research Council. Both panels will be glad to receive suggestions and ideas on the form and content of undergraduate courses in their subjects.

The *ad hoc* Panel on Systematic Botany Courses includes Lincoln Constance, University of California (Berkeley), Chairman; Har-

lan Lewis, University of California (Los Angeles); Reed Rollins, Harvard University; Robert Thorne, State University of Iowa; and Herbert Wagner, University of Michigan.

Members of the *ad hoc* Panel on Parasitism Courses are Clay G. Huff, Naval Medical Research Institute, Chairman; L. O. Nolf, State University of Iowa; Richard J. Porter, University of Michigan; Clark P. Read, Johns Hopkins University; A. Glenn Richards, University of Minnesota; A. J. Riker, University of Wisconsin; and Leslie A. Stauber, Rutgers University.

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## A Study of the Factors Affecting the High School Student's Choice Regarding a Science Career

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This study was made to discover why students at the high school level chose to enter fields of endeavor other than science. It was believed that students have been exposed to certain conditions in the school which were of influence in their final choice of a career. Some of these factors could have been: (a) the interest in science shown by the teachers; (b) the guidance received by the students; (c) the provisions made by the school in regard to the facilities and the use of the laboratory as an instrument of learning; (d) the availability to the students of supplementary science activities; (e) the presentation by the school of the courses in science and mathematics necessary to provide students with the fundamentals in those areas.

To implement such a study, questionnaires were sent to staff members in a group of secondary schools of various sizes and locations. A number of schools in the State of Colorado were chosen to receive these forms as well as a similar number of schools in various other parts of the United States. Returns were made by twenty-one schools involving the participation of twenty-one principals, sixty-five science teachers, twenty-four guidance coun-

selors and 594 senior students. The students who took part in this research were chosen from classes which would best provide a picture of the typical student. Some of them were interested in science and many were not. In addition to the information offered by the high school students, fifty-six college freshman who were enrolled in the Basic Communication classes of the University of Denver also returned similar questionnaires for the purpose of comparison.

As a result of personal contact with many principals as well as the information provided by the questionnaires, it appeared that a large proportion of these principals: (a) were not too well aware of the nation's critical need for personnel trained in science; (b) were more interested in keeping poorly qualified students out of science areas than in guiding potential scientists into the field; (c) were quite blind to the academic inadequacies of their science teachers as well as to the poor science teaching situations that were the result of inadequate laboratories, science texts and supplementary science activities; (d) were apparently satisfied that as long as the physical sciences and the more advanced courses in