

Some Problems in the Teaching of Biology*

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As many of the readers of ABT know, the Biological Sciences Curriculum Study was established by the American Institute of Biological Sciences in January, 1959, with the financial assistance of the National Science Foundation. The participants in the Curriculum Study represent secondary school biology teachers, college biology teachers, superintendents, state departments of education, medical education, agricultural education, museums and botanical gardens, university administrators, science authors, colleges of education, and other areas.

The BSCS is concerned with biological education at all levels, kindergarten through graduate school, and has begun its initial work with secondary school biology. It is planning to hold a Writing Conference on the campus of the University of Colorado this summer to design a new and improved series of courses to serve as the first offerings in biology at the secondary school level. It hopes to develop a unified study of living things in courses suitable for the majority of students in our high schools.

For those interested in learning more about the Curriculum Study, a *Newsletter* has been prepared, and copies of it may be obtained free by writing to the BSCS at the University of Colorado in Boulder.

A large number of questions have been discussed by some of us associated with the Study. At this time we would appreciate learning of the reactions to some of them by biology teachers whom we have not yet been able to contact personally. We realize that many of these questions can be answered by properly conducted investigations. We also realize that there may be no single best answer to some of these questions and that teachers of equal competence may obtain equally good results using quite different methods. For reasons of inclination, environment, or other circumstances, a particular teacher might quite properly prefer one approach to another

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that seems to be equally good on theoretical grounds. Thus, the reactions of practicing teachers to the following propositions would be of real interest to us. We invite comments from teachers who have given these matters serious thought.

PROPOSITION 1

A. Secondary school students are most readily motivated by progressing from the familiar to the unfamiliar. This suggests that a first course in biology could begin with human anatomy and physiology and proceed to less familiar aspects of the life sciences.

B. Secondary school students are most readily motivated by beginning with novel materials and then progressing to more familiar materials. This suggests that a first course in biology could properly begin with microbiology in which most students would be introduced to the living world of protozoa and bacteria for the first time.

PROPOSITION 2

A. Better basic understanding is obtained by treating one topic fully and in depth before proceeding to another topic. This suggests that a biology course might consist of related but discrete units such as genetics, evolution, and others.

B. Better basic understanding is obtained by introducing the same idea in a number of different places throughout a course of study. This suggests that ideas like genetic continuity and evolution be threaded throughout the course and that they appear in several different associations in a biology course.

PROPOSITION 3

A. Current journals and sources provide an adequate coverage of basic information and new developments in the biological sciences in a form suitable for secondary school biology teachers.

B. There is a need for new sources that will provide materials on basic information and new developments in the biological sciences

specifically designed for secondary school biology teachers.

PROPOSITION 4

A. As a contribution from the BSCS, the typical high school biology teacher would prefer to have available a number of individual units, or topics, that he could (if he desired) utilize in his present course by substituting such units for portions of the material he currently presents.

B. As a contribution from the BSCS, the

typical high school biology teacher would prefer to have several complete courses available, one of which he could (if he desired) utilize as a replacement for his present course.

The BSCS would welcome comments from members of the NABT about these propositions and about other aspects of secondary school biology. We are anxious to have the advice of all secondary school biology teachers who are interested, as we are, in improving the biological sciences curriculum in the American high school.

Red Tide

Possible control of "red tide"—the mysterious ocean scourge that breaks forth from time to time, often killing many fish, may be possible. Dissolved copper is "extremely poisonous" to the tiny organisms which cause the red tide, Albert Collier of the United States Fish and Wildlife Service said. Other microscopic life in the water produces substances which can counteract the effects of copper and greatly promote red tide development. Complex biochemical and biological balances in the sea, not yet completely understood, affect the growth of the Florida red tide organism named *Gymnodinium brevis*. It was found that the organic compounds present can combine with copper in such a way that it is no longer toxic. Thus a dense concentration of organisms producing organic chemicals may at the same time make the water less toxic to *Gymnodinium brevis* and provide growth-promoting substances. In addition, other organic substances not necessarily related to the above have been demonstrated to occur in sea water and to affect the behavior of oysters. These substances are carbohydrates, which include such things as sugars and starches. Experimentally it has been demonstrated that the vitamin niacinamide will influence the behavior of oysters in a very pronounced way, and very dilute solutions of ascorbic acid, the commonly known vitamin C, will induce breeding behavior in barnacles immediately on contact.

Organic compounds also provide food for the growth of bacteria, and some bacteria in the sea will produce vitamin B-12, an important growth factor for many living organisms. It has been shown experimentally that certain bacteria producing vitamin B-12 will

grow in the presence of *Gymnodinium brevis*, but not in its absence, when a culture medium designed for *Gymnodinium brevis* is used. This shows how various organic compounds in the water can affect the life processes of the oceans and bays.

Nutrition

Professor Clive M. McCay, one of the world's experts on food, and a professor at Cornell University, states that the average person allows his diet to get worse in old age. He blames the decline in diet on unnecessary economy with food, dentures, poor cooking arrangements, and eating alone. There is no reason for Americans—regardless of age or income—to have a poor diet, if the money is spent in the selection of good food and the food is prepared properly.

Professor McCay is of the opinion that the best overall program for elderly individuals today is to read and study literature on foods and nutrition. At the same time, we all need to be objective in thinking of the problems of our individual bodies.

Bibliography Available

A new bibliography of PAPERBOUND BOOKS IN THE HISTORY AND PHILOSOPHY OF SCIENCE has been prepared as a guide for high school science teachers. This 16-page, mimeographed bibliography lists approximately 200 titles and includes an estimate of the difficulty of the content and language of each book. High school science teachers may obtain a copy of the bibliography by sending a request to the compiler, Leo. E. Klopfer, 73 Batchelder House, Harvard Graduate School of Education, 7 Kirkland Street, Cambridge 38, Mass. Please enclose 10¢ to cover mailing expenses.