Reports—Current Topics—Queries

AUDIOTUTORIALS FOR STUDENT HELPERS

Almost every biology teacher has laboratory tasks that are routinely performed by student assistants. The training of these assistants is often a frustrating and time-consuming effort that must be repeated each semester. Many times I concluded that doing the routine chores myself was the most efficient solution.

Much of my teaching is now done in an audiotutorial laboratory situation; and it occurred to me that the same techniques used in teaching the class could be used in directing laboratory assistants. So I prepared a series of Super-8 film loops of some of the laboratory duties required in introductory biology. I use the film loops in combination with taped explanations or written instructions that enable a neophyte assistant to complete his assignment with a minimum of direction.

By making my own film loops I can illustrate techniques and the use and location of equipment. In addition, this audiotutorial unit is now available for continual use, even though assistants come and go.

The following list are topics I plan to develop in the near future: maintenance procedures for the mouse colony, cleaning tape recorders, preparing an osmometer, preparing sucrose solutions for a turgor experiment, and splicing tapes.

Gordon G. Snyder
Schoolcraft College
18600 Haggerty Rd.
Livonia, Mich. 48151

A HANDBOOK OF ESTUARINE LIFE

The tides of Chesapeake Bay oscillate the waters, caress the shores of Maryland and Virginia, and cause the fresh and marine waters to join and mix. This intermingling occurs in the bay's many estuaries. There is much knowledge about these rich and highly productive estuaries, which serve as nurseries for many of the ocean's life-forms; it is equally true, however, that much is unknown about the complex biotic and abiotic interactions that sustain the estuarine ecosystem. How, for example, are man's activities affecting the Chesapeake region—its estuarine productivity and the bay's evolution? To answer the questions will require comprehensive studies and the interest of all who benefit from the bay. Not only would greater attention to these studies pay all of us dividends in conserving and protecting this significant resource, but there could be a real gain in the classroom by bringing the young people of the region closer to the heritage that sustains them.

The need to introduce estuarine studies into the public-school curriculum has led to the commissioning of a teacher's handbook on saltwater studies. Supported by a grant from the Maryland Department of Education, five science teachers—Ben Sturgis, Elliott Carpenter, and Mrs. Ervin Watson, of Calvert County, and Ford Dean and I, of St. Mary's County—worked on the manual, which is now being used in the schools.

The writing team decided to direct its efforts toward producing a handbook that would assist any teacher interested in establishing saltwater environments in the classroom. With this aim in mind, the first task was to gain experience in setting up a small laboratory. With the help of Tom Wisner, education specialist at the University of Maryland's Solomons Island biology research laboratory, the five southern Maryland teachers were able to establish a small marine-biology laboratory in a vacant garage owned by the research facility; painted white and air-conditioned, it became a splendidly isolated lab. Glass tanks with subgravel filtration were arranged throughout the room; these became the containers for a series of experiments to determine the viability of saltwater organisms for practical classroom use. Each tank contained a specific kind of water in which plants and animals found in the bay and its backwaters could be investigated.

From this practical experience, the saltwater-studies manual for teachers was written. The first part of the handbook is devoted to helping the teacher obtain or build proper aquarium tanks. Problems of water filtration and the kinds of water to use are explained. Drawing on the experience of the Solomons Island staff, the writers were able to explore the problems of maintaining the saltwater tanks for prolonged periods. The manual suggests ways to minimize maintenance worries.

The kinds of living creatures with which to stock the tanks is not so easily determined. A teacher can simply collect specimens and indiscriminately dump them into a tank; but these new homes would soon become bacterial soups having a stench all their own. Instead, the manual tells the teacher what bay organisms can be most easily maintained in the tanks. In this section, attention is given to the very important problem of balancing the aquarium tanks: the teacher is aided in determining not only the kinds of life that may be held in the tanks but also the quantities of each. This section contains notes on the natural history of the most easily maintained organisms. The manual also presents a few short-term, alternative life-forms that are not so easily maintained but could be excellent for investigation and appreciation by the students.

The handbook concludes with a series of laboratory and field activities that could serve as core material for an individually designed course of estuarine studies. (The teachers who wrote the manual knew that each classroom situation is different. That is why they wrote a supportive guidebook rather than a complete course of studies.)

Chesapeake Bay is a living resource. The biologic precepts of the traditional curriculum, as well as the joy of scientific search and discovery, can be revealed to the student who examines the bay and the rivers that enter it. And these studies can teach all of us the value of conserving and preserving its life. The teacher's handbook for saltwater studies is intended to encourage the use of this resource.

David W. Morgan
Delaware Department of
Public Instruction
Dover 19901

SCIENTIFIC AMERICAN IN HIGH-SCHOOL CLASSROOMS

Many science-education specialists and classroom teachers have maintained that articles from *Scientific American* can be used to achieve certain goals in high-school science. The authors of nearly all high-school biology textbooks have suggested, directly or implicitly, that certain articles from *Scientific American* are relevant to the contents of their books and are useful as concurrent or supplementary reading material. Yet I (a former high-school teacher) have found this journal in few classrooms or otherwise in students' hands. When students are questioned about this they usually say that they consider *Scientific American* too technical or too difficult.

In a recent survey of 552 students of beginning chemistry, in 10 high schools in southwestern Michigan, I discovered that 69% of these students had never read a *Scientific American* article, 23% had read one or two articles, and only 8% had read more than two articles.

On the assumption that certain articles from *Scientific American* are indeed appropriate for high-school students but that they could be improved by the addition of explanatory aids, a biochemist and I prepared a set of four annotated articles in the field of biochemistry. The articles consisted of reprints of *Scientific American* pasted on larger sheets of paper, in the margins of which we typed notes designed to define or illustrate difficult words, concepts, or techniques. Using an experimental procedure, I attempted to compare these articles with the (nonannotated) originals to see which set of materials led to greater understanding of the contents of the original articles. The subjects of the experiment were the 552 chemistry students mentioned above.

Within the confines of the experiment, which lasted only three days with each class, I failed to detect gains in mastery of content on the part of those students who read the annotated articles when compared with those who read the nonannotated articles. However, at the end of the experiment the students (all of whom had read one of each kind of article) were asked which kind they would prefer to read if they were presented with a third (hypothetic) article. By a margin of more than four to one the students indicated that they preferred the annotated articles to the original articles. Also, more than two thirds of the students indicated a willingness to read articles from *Scientific American,* on topics of their choice, in future.

In view of this response, I would like to suggest that science educators consider further research in the use of journal articles by high-school students. This research should include attempts to develop explanatory aids that illuminate parts of the original articles found to be difficult for high-school students. I believe that if annotation is used the zest and excitement of the original article can be preserved and that the presence of annotation—which may be consulted or ignored—will make the articles less threatening to students who have only an elementary knowledge of science.

The study described above was part of my work toward a doctorate (awarded April 1972) at Western Michigan University. My dissertation was entitled "The Effect of Annotating Articles from *Scientific American* on Student Understanding." Other unpublished dissertations dealing with the use of journal articles in science courses include "Effects of Teaching with Science Articles in a College, Physical Science Course," by Jack H. Robinson (Harvard University, 1960; discussed in *Science Education* 47: 74); "The Effects of a Method of Teaching Secondary School Biology Which Involves the Critical Analysis of Research Papers of Scientists on Selected Science Education Objectives," by Howard B. Baumel (New York University, 1963; discussed in *Science Teacher* 32: 29); and "A Determination of the Effectiveness of the Critical Analysis of *Scientific American* Papers in Biological Science at the College Level," by Murray Stock (New York University, 1968).

John Knapp II
Campus School
State University College
Oswego, N.Y. 13126

MICROSCOPE BRACE FOR THE HANDICAPPED

The plight of a cerebral palsy victim led us to create a device that stabilizes a microscope for use by a handicapped person. Although such students may be in regular classes, they often cannot take an active part in certain learning experiences, such as microscopy, because of their lack of coordination. In this instance a simple frame was contructed from materials obtainable from most school shops. Directions for making it are as follows:

Of fiberboard, plywood, or thin wood board make a rectangle about 15 inches wide and as long as the laboratory table is wide. In the center of this board and at a comfortable distance from a seated student