

There are some uses of living *Rana pipiens* for which educationally effective substitutes are not available. However, there are several common laboratory exercises for which frogs may be easily replaced by other living material. First, a significant percentage of frogs used in teaching are pithed and dissected to provide a quick overview of vertebrate structure. A number of animals could be substituted for frogs in these exercises. Young cockerel chicks, obtained from local hatcheries at very modest prices, have been used by some departments. Second, a high-consumption use of frogs is in the preparation of "spinal frogs" for demonstrating reflex responses. Why not substitute a set of exercises on human reflexes and sensory physiology for the frog work? Surely many students will consider human reflexes much more "relevant" than those of a frog. Third, the African clawed frog, *Xenopus laevis*, can be substituted in many of the developmental studies for which the leopard frog is used. This convenient organism, with its very rapid developmental rate, will no doubt gain in popularity because of the "frog problem." Finally, there is considerable mortality during the prolonged holding and shipping of live animals that can be circumvented in the use of preserved specimens. The substitution of preserved frogs for living ones, wherever possible, would cause less drain on their populations.

The needs of each biologist are unique to local situations. Yet most of us can think of ways to decrease the unnecessary killing of frogs without abandoning their use in work for which they are essential.

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AN ADVANCED PLACEMENT BIOLOGY TEACHER RESPONDS

It was most enlightening to see an example of the objective questions of "The Advanced Placement Exam in Biology" published in May (*ABT* 36 [5]:282), by William Kastrinos and Frank C. Erk. My purpose is not to criticize the test but to comment on the AP biology program as a whole. After eight years of teaching (two years of AP biology), I am becoming more convinced that while students may answer objective and essay questions with facility, a deeper probe of their answers will reveal naiveness and glaring deficiencies.

I believe the fault lies with an AP program which insists on covering every concept in biology. I applaud the College Board for recently asking department chairmen of the 100 colleges and universities regularly receiving the most AP candidates in biology to des-

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Essay questions from the 1971 Advanced Placement exam in biology. (Copyright © 1971 by Educational Testing Service, Princeton, N.J. All rights reserved. Reproduced by permission.)

BIOLOGY SECTION II

Time—1 hour and 30 minutes

Answer Question 1 below.

1. The process of photosynthesis consists of two phases, the light reactions and the dark reactions. Discuss each of these groups of reactions and their interrelationships.

Answer *either* Question 2 *or* 3 below. Number your answer as the question is numbered in the examination book.

2. Describe the anatomy and physiology of the autonomic nervous system of vertebrates. How does this system help a vertebrate to survive?

OR

3. The transmission of an impulse from a nerve to the surface of a resting muscle initiates a contraction in that muscle. Biochemical and biophysical studies of muscle tissue have resulted in an explanation for muscle contraction known as the sliding filament hypothesis.

- Describe the chemical changes that occur when a nerve impulse is transmitted to the surface of a resting muscle cell.
- Describe the internal structure of a muscle fiber as revealed by electron microscopy.
- On the basis of this structure, explain the sliding-filament hypothesis.

Answer *either* Question 4 *or* 5 below. Number your answer as the question is numbered in the examination book.

4. Although man spends billions of dollars annually to protect both himself and his food against bacterial activity, it is also true that life as we know it could not continue to exist on the face of our planet without the help of bacteria.

- Discuss two ways in which the activities of bacteria and fungi are essential to the continuation of life on Earth.
- Discuss the ways in which knowledge of these organisms has been useful to man in medicine and food processing and preservation.

OR

5. A mature forest community is completely destroyed by fire. Describe the stages of succession by which this community is restored.

END OF EXAMINATION

After completing the examination, turn to the back of your essay booklet and circle the questions you answered.

cribe their introductory programs; but I cannot believe that any college has an introductory course that covers the composite courses of all 100 schools. While the AP course description booklet claims that a teacher may emphasize one area or another, the truth is, because essay and objective questions cover all areas, an AP teacher is forced to superficially race through every concept.

I would like to see the members of the College Board limit their suggested list of topics. I agree that all areas mentioned are important; however, some can be cut back. For example, isn't it asking a lot of students whose knowledge of chemistry is limited to be conver-

sent in ALL of the following: glycolysis, Krebs' cycle, electron transport, oxidative phosphorylation, fermentation, specific details of light and dark reactions of photosynthesis, and other complex relationships of intermediary metabolism? While I agree it is important for a beginning student to be familiar with the nervous system, isn't it asking a lot for him to be knowledgeable on such recommended topics as the relationship of the sympathetic division of the autonomic nervous system to the adrenal medulla or the action of psychodynamic drugs?

I submit that there is a limit to the number of concepts a beginning student may truly understand. I am not advocating making the AP program easier; rather, I think it should be made more manageable. After all, the program is designed to be equivalent to a first-year course, not a degree in biology.

The May article did not list any of the essay questions. The accompanying table lists the essay questions from the 1971 Advanced Placement exam. Questions 2 and 3 deal with topics on animal physiology which could be only briefly covered in many first-year courses. Other essay questions from past AP exams have dealt with very limited topics in botany or biochemistry.

One possible improvement of the AP exam would be to expand the objective section and put less than the present 50 percent emphasis on the essay section. The objective section is an adequate cross section of all areas of biology. If a student hasn't covered a topic, he only loses a few points. However, there are many excellent first-year biology courses in which the autonomic nervous system and muscle physiology are only briefly discussed. Students in these courses would have had a significantly lower score on the 1971 essay portion. Another possible solution would be to give a student a broader selection of questions to choose from.

The suggested course content for AP biology is destroying one of the most important goals of a biology course—to create interest and excitement so that the student will want to pursue further work in biology. The AP program must cut back its list of topics so that biology teachers can offer viable programs that will excite students. We would appreciate a less hectic schedule which would allow us to pursue some specific interests. We must tie more concepts to a laboratory program if our students are to have a true mastery of some aspects of biology rather than a superficial glimpse of everything.

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William Kastrinos preferred not to comment.

PROMOTING N.A.B.T. MEMBERSHIP

In the last few years, as my student teachers neared the end of their assignment with me I have given them a one-year gift subscription to *American Biology Teacher*.

In this way I was able to show my appreciation to the student teacher for his assistance in my classroom in a way that, I feel, is of great benefit to a young person entering the profession of biology teaching. It has been my experience that most young people who have received such a subscription from me or from another teacher have renewed their membership in NABT in successive years. They have often remarked that they too have found *ABT* to be an especially informative and interesting journal.

Although I have no hard data to support this, I suspect that supervising teachers who give one-year gift subscriptions to *ABT* are using one of the most effective ways of encouraging continuing membership in NABT. I would like to know how many other teachers have been doing this, and I encourage those who have not to try it.

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Peace Corps Needs Biology Teachers

Hundreds of developing nations in the Third World request biology teachers and researchers in agriculture, nutrition, health, and industrial programs. Biologists are needed to train teachers, develop curricula, and write guides and tests, in addition to teaching at secondary and university levels, in Latin America, Africa, Asia, and the South Pacific.

A Peace Corps volunteer's commitment is normally for two years. A monthly allowance covers all living expenses; travel to and from assignments, as well as medical care, is provided; and \$75 per month is put aside for each volunteer to be received at termination.

Most easily placed are single teachers or married couples who both teach. Families are not being placed at this time. Teachers approaching retirement or already retired are encouraged to apply.

For further information write Beth Hitchcock, ACTION/Peace Corps, McCormack Bldg., Boston 02109.

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