Reports—Current Topics—Queries

Drosophila Sperm for Cell Physiology

During the summers of 1970 and 1971 I was a research participant in a National Science Foundation program for college teachers in the Department of Biochemistry and Biophysics, Oregon State University. There I became acquainted with some synthetic defined diets for rearing *Drosophila* that may be of interest to a wider audience of biology teachers.

One of these diets was devised by B. W. Geer (1963), of Knox College. Geer (1967) further has described how a substitution of carnitine for the choline in the normal diet leads to sterility in the male *Drosophila*, owing to loss of sperm motility. This sterility is associated with a defect in sperm mitochondrion development, according to Geer and R. W. Newburgh (1970).

The relative ease with which motile sperm preparations can be obtained from the seminal vesicles of *Drosophila* raised on choline-containing diets or one of the standard yeast-and-cornmeal diets is remarkable. It is a simple matter to dissect out the sperm—they are almost 1 mm long—with fine forceps under a dissecting microscope from the male reproductive tract, which occupies most of the abdomen. A suitable medium for dissection is the *Drosophila* Ringer's solution: NaCl 7.5 g, KCl 0.35 g, $CaCl_2$ 0.21 g, and water to make up a liter of solution as described by B. Ephrussi and G. W. Beadle (1936). Satisfactory anatomic drawings to aid dissection are to be found in an article by Albert Miller (1965, p. 508-509).

Cell-physiology classes could profit from an exercise in the technique for isolating these sperm and studying, for example, the ionic and nutritive requirements for sperm motility.

References

EPHRUSSI, B., and G. W. BEADLE. 1936. A technique of transplantation for *Drosophila*. *American Naturalist* 70 (728): 218-225.

GEER, B. W. 1963. A ribonucleic acid–protein relationship in *Drosophila* nutrition. *Journal of Experimental Zoology* 154 (3): 353-364.

———. 1967. Dietary choline requirements for sperm motility and normal mating activity in *Drosophila melanogaster*. *Biological Bulletin* 133 (3): 548-566.

——— and R. W. NEWBURGH. 1970 Carnitine acetyltransferase and spermatozoan development in *Drosophila melanogaster*. *Journal of Biological Chemistry* 245 (1): 71-79.

MILLER, A. 1965. The internal anatomy and histology of the imago of *Drosophila melanogaster*. In *Biology of Drosophila*, ed. by M. Demerec. Hafner Publishing Co., New York. Ch. 6, p. 420-534.

Allen Isaacson
Biological Sciences Dept.
William Paterson College
300 Pompton Rd.
Wayne, N.J. 07470

Stream Pollution: a Teaching Model

When teaching water microbiology it is important to emphasize that fecal pollution may be masked in streams. This report outlines a teaching model that illustrates this point.

During a basic microbiology course our students conducted the presumptive test (H. J. Benson, 1969: *Microbiological Applications*, William C. Brown Co., Dubuque, Iowa) with water samples taken from a small woodland stream that receives effluent from a sewage treatment plant. The results indicated that water (clear in appearance) above the effluent inflow contained more coliform bacteria than did water (slightly turbid in appearance) below the effluent inflow.

Seven plate counts, using tripticase glucose extract agar for total counts and violet red bile agar for coliform counts, were then conducted at weekly intervals on water samples taken upstream (point A) and downstream (point B) from the effluent inflow. Specifics relative to these counts included inoculation with 1-ml amounts of undiluted sample, triplicate plating, and incubation at 37 C for 48 hours. Results were analyzed with the t-test.

Statistical analysis of the plate-count data (see

Bacterial density of stream water above and below effluent inflow from a sewage-treatment plant.

Week	*Bacteria per ml/sample* A^a	B^b
TRIPTICASE GLUCOSE EXTRACT AGAR		
1	181	55
2	—	—
3	372	32
4	294	28
5	244	21
6	697	411
7	305	93
Ave.	349	107
$t = 8.1 \quad P = >0.01$		
VIOLET RED BILE AGAR		
1	157	14
2	146	27
3	195	0
4	192	9
5	163	0
6	510	12
7	205	14
Ave.	224	11
$t = 4.4 \quad P = >0.01$		

[a] Upstream from effluent inflow
[b] Downstream from effluent inflow

table) indicated that the number of bacteria at point A was significantly higher than at point B ($P > 0.01$). Subsequent study revealed that the stream, above point A, drains a neighborhood that uses septic tanks. This drainage probably accounts for the high levels of bacteria observed at point A. The reduction in viable bacteria, as observed at point B, may have been due to the chlorine content (0.35 to 2 ppm) of the effluent.

Teaching models of this kind easily demonstrate that the appearance of water is a poor indicator of fecal pollution.

Howard C. Leslie, Donald M. McKinstry
Biology Dept.
Pennsylvania State University
Behrend Campus, Erie, Pa. 16510

"Why Don't Biologists Say What They Mean?"

We high school biology teachers have for years been defending the work of science and of scientists, which, in the strict sense, we are not. One of our staunchest defense mechanisms must be called on for this frequently asked question: "Why don't biology teachers say what they mean? Why do they have to invent those long, hard-to-pronounce, difficult-to-spell words just to say (such and such)? Why don't they say it in plain English?"

Why do biologists do this? Some high school biology students, unfortunately, never develop past the point of having to learn "all these terms" just to be able to understand the questions on the test. If this is so, can't we biology teachers present our ideas without what we know is going to be a mental block for these students? We know, of course, that we can't. The problem, then, is not one of trying to teach biology without using terms but one of trying to make the students see why it can't be done. This problem can be solved.

For the past several years I have intentionally precipitated the above question by selecting a short article from a scientific journal—one selected for its large number of scientific terms—and distributing it to my students to read in class. The article never takes more than three or four minutes of the average student's reading time. It is given to the students without any explanation as to the purpose of the reading. When they are finished, they are asked if they understood it, and invariably the "hard words" question is raised.

Without making any attempt at an immediate answer to that question, I ask the students to recall from their English courses what the purpose of language is—whether the language be verbal or visual. They all know, of course, that language is really nothing more than a convenient way to convey an idea, from speaker to listener or from writer to reader. Good! With a little prodding, a few specific examples are brought out. Consider, for instance, the word "brave," which we all use frequently enough. Suppose a speaker or a writer wanted to engender in the mind of a listener or a reader the abstract ideas associated with the word "brave." Is there a simpler or more convenient way of doing this than by using the word? No, the students admit.

We then talk for a few minutes about the work of scientists, and we recall a point that is usually made quite early in a high school science course. The point is that a great deal of a scientist's time is consumed in reading reports of the work of other scientists and writing about his own work. The total number of words written and read by scientists throughout the world in any given period must be enormous. The students see that this must be so. "Is it not rather important, then, that the writing be done in as concise a manner as possible? If not, how would a scientist ever be physically able to keep abreast of his field?" Most high school students have never been inside a typical scientist's office to notice the stack of back-logged journals on his desk, all earmarked "to be read tomorrow." Most, however, do remember seeing a somewhat similar situation: medical journals stacked on their family physician's desk.

At this point it is tempting, though I have never done so yet, to give them a dictionary of scientific terms and ask them to rewrite the article they have just read—this time leaving out all of the terms they consider to be scientific jargon and using only equivalent expressions as contained in the dictionary. In other words, I might ask them to rewrite the article "in plain English." Having them actually do this really isn't necessary, because they readily recognize that the length of the article would have to be dramatically increased.

Okay, then: the biologist has to use terms to eliminate a lot of unnecessary words. But can't he use terms that are already familiar to most people? Usually this question doesn't have to be answered by a teacher, because the obvious answer will be volunteered by a preceptive student; namely, that new ideas call for new terms. Most people are not familiar with biologic terms because they are not familiar with the ideas the terms express. It is just that simple. As an example at this point, the word "heterotroph" can be introduced. After explaining to them what is special about an organism that is heterotrophic, I ask the students how many words would be wasted, or how much time, if when we wanted to refer to an organism that is heterotrophic we had to describe it, instead of using the word heterotroph.

By this time, most students are quite willing to admit the necessity of biologic terminology. This doesn't make their task of learning the terminology any easier, but at least they understand the purpose of it all.

This way of explaining terminology to beginning students is certainly not novel. I remember Don Herbert—TV's "Mr. Wizard"—using a similar technique in one of the programs of his popular series. Also, I am aware of the success of many of the new