

Genetic Code Clarification Appreciated

Dear Editor:

I have just read the guest editorial by Ricki Lewis in the February issue about the use and misuse of the term *genetic code*. Thank you for publishing it; this topic has been a sore point of mine for years.

In many biology books, the term *message* is used to refer to the sequence of bases in both DNA and mRNA. Thinking of the base sequence as a message makes it easier for students to understand the concept of a genetic code and why the process of translation is necessary. Students learn that the message in DNA is written in a DNA language—the nucleotide bases—and must be translated into a protein language—the amino acids—before a protein can be produced. This translation is, in effect, the function of the genetic code.

Teachers of molecular genetics may find this analogy helpful in teaching DNA translation, a concept that many students find difficult to grasp.

Linda Blumenthal
Editor, *Science*
Glencoe/McGraw-Hill
Westerville, OH 43081

Genetics Book Review Called Unfair

Dear Editor:

It is only fair that I have the opportunity to respond to the unnecessarily nasty and irrelevant criticism of my book, *Human Genetics, Concepts and Applications*, from Bill Lindsay, published in the May issue. He took one sentence from my text out of context, misunderstood it, and accused me of making claims that I did not. Migration patterns (not packing one's bags for parts east) can indeed alter gene frequencies—which was the point that section of my book makes.

What puzzles me is why he chose to do this. Supposedly, it was in response to my guest editorial concerning misuse of the term "genetic code." I wrote this piece to entertain and inform. I never claimed that I am immune from making errors!

I also appreciate Mr. Lindsay's correction of my word usage in the editorial. I suggest he look up a few terms too—he could start with "apology."

Ricki Lewis, Ph.D.
Scotia, NY 12302
76715.3517@compuserve.com

Teach Evolution with a Historic Perspective

Dear Editor:

Permit me to comment upon "NABT Unveils New Statement on Teaching Evolution."

It seems to me that NABT misses the opportunity to discuss "Science as a Cultural Force." When a student tells me that he cannot accept the concept of evolution for religious reasons, he is not asking for scientific evidence. To 50% of the U.S. population a scientific answer is irrelevant. As a teacher, how can I turn this dilemma into a learning experience?

Evolution is more than mere biology. Its social and humanistic implications cry out to be addressed and in an environment of thoughtfulness. In teaching evolution we must look at scientific ideas in historic perspective. During the past 500 years we have moved from supernatural to natural explanation and this change in point of view has had an enormous psychological impact upon us.

Look boys and girls, we have been through this many times. The lesson of Darwin is the lesson of Copernicus, Galileo, Hutton. What would have been the fate of Darwin had he published "The Origin" in 16th century Italy? Do we still look upon heliocentrism and a spherical earth as scientific heresy? Why did we change our mind? Has religion been destroyed by heliocentric theory?

The teacher is obliged not only to present scientific ideas but also to inquire how these ideas affect us. The trouble with evolution is that it is too difficult for the biology teacher.

In my opinion, the writers of "teaching evolution" miss the major impact of science on the citizen. The 21st century will be worse. It is time for the teacher (and NABT) to face up to their humanistic responsibilities. I have arrived at this approach after many years

of teaching evolution as merely science to students and to citizens.

Sincerely,
Arnold M. Clark
Retired Scientist
Marine Biological Laboratory
Woods Hole, MA 02549

Dear Editor:

Each month a new issue of *The American Biology Teacher* arrives, each with a lovely cover photograph of something suitably biological. Just inside the cover resides information about the cover and the NABT member who captured the image. All too often, the photographer is someone selected from one of our college members, a group that represents 20% of the total NABT membership. Less frequently of late, the photographer is a high school teacher, a group that represents 70% of the membership. The latest issue (May 1996) represents an all-time low, the selection of the work of a commercial

Editor's Note: Who was caught napping? The orchid on the front cover of the May '96 issue of *ABT* was upside down!

If you carefully read the description of the Swan Orchid and studied the picture, you would have detected that the orchid was upside down. Although equally beautiful to the human eye in both directions, nature requires functionality. Unlike most orchids, this orchid must have its lip up. It evolved that way so that an insect could rock with gravity on the lip callus and its lower thorax pick up the pollinia (wax-like pollen balls filled with millions of pollen cells to create millions of seed in the single flower it pollinates). So, to pick up pollinia and deposit it on another flower, this also means that the length of the insect must be correct. And by extension, if insects/animals of this size that visit the flower become extinct, this exquisite species will also likely become extinct. From this exercise, it is clear that if we desire to truly understand nature and natural processes, we must carefully study them. Keep on your toes . . . NABT may again test your biological reasoning in the future!

photographer complete with a commercial! As one of the high school teacher members, I am protesting this blatant commercialism by an organization that I and my colleagues abundantly support.

Judy Brown
NABT Member
Silver Spring, MD 20904

Managing Editor's Note: Cover slides are selected based on quality of image, composition (vertical orientation with room at the top for the banner), and subject matter. Although our college members represent 20% of our membership, they submit 83% of our slides. Regarding mention of where the prints could be purchased, we thought that the information would be of interest to our members, given the number of requests we've had for slide files, and proceeds from sales help fund K-12 science education kits.

Random Samples Not Always Best

Dear Editor:

The content analysis of biology textbooks by Lumpe and Beck (1996) is a nice illustration of inappropriate sampling techniques. Lumpe and Beck (1996) used a random sample of only 5% of the total pages so, for example, only 42 of *Modern Biology's* 831 pages would have been sampled. Thus, a minimum of 11 of its 53 chapters were not sampled at all, and there is a very high probability that more than 11 chapters were not sampled. This could easily have skewed the results because some chapters emphasize one of the four themes much more than the other themes. For example, one chapter is specifically devoted to the Investigative Nature of Science theme. This is an example of a case where completely random sampling is inappropriate given the structured nature of textbooks. Random selection of 5% of each chapter would be a more logical and accurate technique.

Contrary to popular belief, completely random sampling is often inappropriate in biological experiments as well. For example, individual organisms that are obviously abnormal are often best excluded. Also, rather than randomly assigning organisms to control and treatment groups, it is often better to "match" control and treatment organisms to assure that control and treatment groups are initially uniform, i.e. not statistically different for the factor(s) of interest. Given the often small size of treatment groups and the

natural variability among individuals, random sampling is likely to result in statistical differences between control and treatment groups before the experiment begins. However, statistical analysis almost always assumes that the

control and treatment groups were not significantly different at the start.

Lumpe and Beck's (1996) use of only two replications (two novice encoders) also seems inadequate because a meaningful statistical analysis cannot be

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