

SCIENCE TEXTBOOK ACCURACY REVIEW FORM
2002

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Verifier Name:	Dr. Nicole Turrill Welch Department of Biology Middle Tennessee State University Murfreesboro, TN 37132	
Verifier E-mail:	nwelch@mtsu.edu	
Verifier	Tennessee Academy of Science	
Organization:	University of Tennessee System	
	State Board of Regents Institution	X
	Oak Ridge National Laboratory	
	Carson-Newman College	

ACCURACY REPORT

I reviewed 10 of the 40 chapters of Miller and Levine (2002). I selected these chapters based on my experience of finding errors or bias that lead to student misconceptions in college textbooks. I also focused on the topics about which first-year science majors and non-majors often bring misconceptions to the college classroom. Overall, I found this book easy to read, very interesting, and generally free of errors.

Chapter 1 The Science of Biology

I did not find errors in this chapter.

Chapter 4 Ecosystems and Communities

I did not find errors in this chapter.

Chapter 6 Humans and the Biosphere

I did not find errors in this chapter.

Chapter 8 Photosynthesis

I did not find errors in this chapter. However, I do feel that the authors' exclusion of PGAL (glyceraldehydes-3-phosphate), an intermediate product of the light-independent reactions, could contribute to a student's misconception that photosynthetic organisms only produce carbohydrates. Plants use PGAL to produce amino acids and fatty acids as well as other macromolecules. I often encounter students who do not understand that plants are comprised of more than just glucose. I strongly feel that this misconception arises when high school biology classes teach photosynthesis purely as a pathway to glucose.

Publisher agrees that the text should be phrased to avoid the misconception about which the Reviewer is concerned.

In Figure 8-11, Step C, on page 212 Publisher will change step C to read: "Two 3-carbon compounds are removed from the cycle to produce sugars, lipids, amino acids, and other compounds."

In lines 7 through 9 from top of page 213, Publisher will change step C to read: "Two of the twelve 3-carbon molecules are removed from the cycle. The plant cell uses these molecules to produce sugars, lipids, amino acids, and other compounds needed for plant metabolism and growth."

Chapter 9 Cellular Respiration

There is a minor error in the caption of Figure 9-1 on page 221. The authors label the inner spaces of the mitochondria as the "intermembrane space." This region of the mitochondria is labeled as the mitochondrial matrix in the majority of biology textbooks.

No change. The line labeled intermembrane space points correctly to the space between the inner and outer mitochondrial membranes. The mitochondrial matrix is the space completely enclosed by the inner membrane, which is not labeled in the diagram.

There is a serious error with the authors' definition of cellular respiration on page 222. It reads "Cellular respiration is the process that releases energy by breaking down food molecules in the presence of oxygen." This definition is too similar to how many students define digestion. A better definition would be "Cellular respiration is the process that releases energy by breaking down glucose in the presence of oxygen." Monomers of organic macromolecules are covered in Chapter 2 of the textbook. The teacher could correct this error by defining "food molecules" as the monomers of organic macromolecules obtained in the diet (monosaccharides, fatty acids, glycerol, and amino acids).

The Publisher agrees to modify the definition of cellular respiration on p. 222 (including the caption for Figure 9-2) and p. 1075 to avoid student misunderstanding. New definition to read: "Cellular respiration is a process that releases energy by breaking down glucose and other food molecules in the presence of oxygen."

Molecular Biology of the Cell, Alberts *et al* © 2002

There is a typographical error on page 222. It reads "As you can see, cellular respiration requires a food molecule such as glucose and oxygen, and gives off carbon, water, and energy." This implies that oxygen is a food molecule and omits the word "dioxide." The sentence should read "As you can see, cellular respiration requires a food molecule, such as glucose, and oxygen, and gives off carbon dioxide, water, and energy."

Publisher agrees to change sentence to read: "As you can see, cellular respiration requires oxygen, and a food molecule such as glucose, and gives off carbon dioxide, water, and energy."

Chapter 15 Darwin's Theory of Evolution

I did not find errors in the chapter.

Chapter 16 Evolution of Populations

There is a somewhat serious error in the first paragraph on page 395. The sentence reads "Recall that each chromosome moves independently during meiosis." The statement should read "Recall that each chromosome of a homologous pair moves independently during meiosis."

Publisher agrees to change sentence to read: "Recall that each chromosome of a homologous pair moves independently during meiosis."

This chapter focuses entirely on evolution by natural selection. A teacher might want to mention that many evolutionary biologists have demonstrated that genetic drift also is a mechanism of evolutionary change.

The Standardized Test Prep on page 415 includes "made-up terms" as answer choices on questions 3 and 9. The chapter did not discuss "size selection" or "geographic selection," therefore, these should not be included in the multiple choice options.

Publisher agrees to change the answers to read:

Question 3, answer A: Genetic drift

Question 9, answer B: Sexual selection

Chapter 17 The History of Life

I did not find errors in this chapter.

Chapter 29 Comparing Invertebrates

I did not find errors in this chapter.

Chapter 32 Mammals

To the best of my knowledge, there are no errors in this chapter. I will admit that the discussion of human evolution included more genera than I have taught in my majors and non-majors courses. Most likely, I'm the one who is out of touch with the current research.