Item	Panel Description of Error	Commissioner's Accepted Response
7A Applying Darwin's Ideas	Based on Epigenetic studies, it is not appropriate to assume that "… if species have changed over time, the genes that determine their characteristics should also have changed". It would be better worded if the 'should have changed' were changed to 'might have changed'. And a second related comment: "For example, if species have changed over time, the genes that determine their characteristics should also have changed." Change "should" to "might." Epigenetic adjustments can cause changes in species WITHOUT changing genes. A good example is the lizard, Podarcis sicula.	Language under Biochemistry changed to, "For example, if species have changed over time, the genes that determine their characteristics might also have changed." (see Attachment A)
7G Complexity of Cells	The red blood cell is referred to as a simple eukaryotic cell, but it has no nucleus, no organelles, and no membranes in its cytoplasm. Therefore, it cannot be referred to as a eukaryotic cell.	The term "Eukaryotic" was removed from the title of the section (see Attachment B).
7A Comparing Hominoid Skulls	- **Lab activity: comparing hominoid skulls**: 2010 research confirms humans and chimps differ by 30%. This fact is not discussed in the lab activity. The human/chimp skull homology does not match the genetic homology. Including the human skull leads students to a conclusion that differs from 21st century scientific research that is testable and repeatable, and should be removed from the activity. "The difference in MSY gene content in chimpanzee and human is more comparable to the difference in autosomal gene content in chicken and human, at 310 million years of separation." The similarities in human skulls with other hominids may be convergent evolution, but it is erroneous to pretend that common ancestry is the cause.	This lab activity was not changed. The same activity is currently included in a three adopted Texas biology programs.
7A Applying Darwin's Ideas, Figure 7	- Whale evolution- 4 fossils is hardly a "transition". 400 intermediates would work. Also, research has shown that there is no reason to	Language for Figure 7 changed to read, "Over the years, scientists have collected a series of fossils that support Darwin's hypothesis about

	believe Pakicetus was ever anything but a land mammal. Also, no complete skeletons have been found, but the picture shows a full skeleton, which a major factual error. It is erroneous to include it in this example. Ambulocetus also shows a full skeleton, which is another major factual error, since no complete Ambulocetus skeletons have been found.	whale evolution. The skeletons shown here are illustrations based on this fossil evidence. Be aware that complete skeletons are rarely found for any fossil species" (see Attachment A). The following language was added to the teaching notes, "Make sure that students carefully read all of the captions for Figure 7. Point out to students that no complete skeletons have been found of Pakicetus and Ambulocetus, but extensive sets of fossil evidence do exist. Complete skeletons are rarely found for any species in the fossil record, but it is not necessary to have a complete skeleton to make strong deductions about the form of an animal, how it lived, and its evolutionary relationships." (see Attachment D)
7A Applying Darwin's Ideas, p. 384	"… A comparison of DNA or aminoacid sequences shows that some species are more genetically similar than others. These comparisons, like those in anatomy, are evidence of hereditary relationships among the species. For example, comparing one kind of protein among several species reveals the pattern shown in Figure 10. The relative amount of difference is consistent with hypotheses based on fossils and anatomy." Correct by saying "… A comparison of DNA or amino acid sequences shows that some species are more genetically similar than others. These comparisons may suggest patterns of descent inconsistent with expectations based on comparative anatomy. For example, comparing two proteins among various species reveals discrepancies shown in Figure 10. In comparative biochemistry, anatomical homologies may not be evidence of close common ancestry."	Language under Biochemistry changed to, "A comparison of DNA or amino acid sequences shows that some species are more genetically similar than others. In most cases, these comparisons provide evidence of hereditary relationships among the species that are consistent with hypotheses based on fossils and anatomy. For example, comparing one kind of protein among several species reveals the pattern shown in **Figure 10.**" (see Attachment A)
7A Applying Darwin's Ideas, Figure 10	- "Figure 10: Scientists have compared the amino acids that make up hemoglobin proteins in several species. Organisms that have fewer differences are more likely to be	The following language was added to the teaching notes, "Teaching Key Ideas: Point out to students that any phylogeny is a hypothesis, whether it is based on anatomical evidence or

	closely related. How does this pattern relate to genetic change?" To Correct, add a second table to Figure 10 entitled "Insulin Comparison" showing that compared to mice, the percentage of insulin amino acid sequence differences in Chickens, Ducks and Turkeys (birds) is 20%; in Rattlesnakes (reptiles) is 27%; in Bonito (fish) and Cod (fish) are 28% and 31% respectively; in Tuna (fish) and Angler fish are 33%; and in Guinea pig and Coypu (mammals) are 35% and 38% respectively. Revise the Figure 10 caption to read: "A phylogeny is an evolutionary tree showing descent from common ancestors. How would a phylogeny based on the insulin comparison differ from a phylogeny based on the hemoglobin comparison?" "Teaching Notes," "Reading: What Darwin Explained," "Answers – Caption Questions … Figure 10 "Genes change (by mutation) over time;	molecular evidence. The hemoglobin data in Figure 10 strongly confirms phylogeny based on anatomical similarities. Not all phylogenies based on molecular evidence are consistent with phylogenies based on anatomy, but in the large majority of cases there is congruence between molecular and anatomical data." (see Attachment D)
7A Animation: Similarities in Macromolecules (Student Resources)	Similarities in Macromolecules" "Darwin observed anatomical features of organisms and hypothesized that organisms that appear similar have a more recent common ancestor than do organisms that do not appear similar. Modern biology proves on the molecular level what Darwin noticed on the anatomical level. The number of amino acid differences in homologous proteins of different species is proportional to the length of time that has passed since the two species shared a common ancestor. Thus, the more similar the homologous proteins are in different species, the more closely related the species are thought to be." Revise "Student Resources, "Animation: Similarities in Macromolecules," as follows: "Darwin observed anatomical features of organisms and hypothesized that organisms that appear similar have a more recent common ancestor than do organisms that do not appear similar. Yet modern biochemical phylogenies often contradict Darwin's anatomical	Language changed to, "Darwin observed anatomical features of organisms and hypothesized that organisms that appear similar have a more recent common ancestor than do organisms that do not appear similar. Modern biology investigates on the molecular level what Darwin noticed on the anatomical level…" (see Attachment C).

	phylogenies. Phylogenies b	
7A Animation: Similarities in Macromolecules (Teacher Resources)	- "Teacher Resources," "Audiovisual: Similarities in Macromolecules – Teach from Visuals" "Remind students that molecular homologies can provide evidence of common ancestry. Ask If the amino acid sequences of homologous proteins in three organisms are known, how could it be determined which two of the organisms shared the most recent common ancestor? (The two organisms with the least amount of difference between their amino acid sequences have the most recent common ancestor.) How is the evidence from macromolecules different from Darwin's evidence of common ancestry? (Darwin observed anatomical features of organisms. He did not use evidence on the molecular level.)"Revise "Teacher Resources," "Audiovisual: Similarities in Macromolecules – Teach from Visuals," to state: "Remind students that a phylogeny shows evolutionary relationships among life forms based either on their anatomical or their biochemical similarities and differences. Ask:Do phylogenies based on comparative anatomy and comparative biochemistry always agree with each other? (No) How does 'convergent evolution' address discrepancies between anatomical and biochemical phylogenies? (It postulates that more closely related life forms evolved traits like those of less closely related life forms.) How does 'convergent evolution' often weaken homologies as evidence of close common ancestry? (It claims that close common ancestry is often not the source of homologies.)Do fewer transitional forms in the fossil record enhance or reduce the evidence for 'convergent evolution'? (They reduce it.)"	The following language was added, "Remind students that a phylogeny shows evolutionary relationships among life forms based either on their anatomical or their biochemical similarities and differences. Ask: Do phylogenies based on comparative anatomy and comparative biochemistry always agree with each other? (No)" (see Attachment D).