

Component ISBN	Item Type	Product Type	Correction Type	Page Number	Description of Correction	Publisher Response
9780133176407	Student	Big Book	Factual Error	521	Eroneously states "use of DNA characters.....has helped to make evolutionary trees more accurate." Actually in many cases systematic DNA analysis has failed to conform to prior taxonomic trees and suggests further work is required to establish evolutionary sequences. An acceptable statement would be "use of DNA characters.....has indicated a need to rethink some previously developed taxonomic trees." To quote from Philip Ball in "Nature" 496, 419-420, (25 April 2013) "in molecular evolution, old arguments, for instance about the importance of natural selection and random drift in driving genetic change, are now colliding with questions about non-coding RNA, epigenetics and genomic network theory. It is not yet clear which new story to tell...When the structure of DNA was first deduced, it seemed to supply the final part of a beautiful puzzle, the solution for which began with Charles Darwin and Gregor Mendel. The simplicity of that picture has proved too alluring."	Pearson is disputing this error.  The text on this page is correct, and does not need to be changed. The complete sentence from the text is: "The use of DNA characters in cladistic analysis has helped to make evolutionary trees more accurate." The text then goes on to describe a specific situation in which DNA characters were used to produce a more accurate taxonomy of American and African vultures. The reviewer does not dispute the accuracy of the text, but cites a 2013 review article pointing out that non-coding RNA, epigenetics, and genomic networks should also be considered in the study of molecular evolution. We agree that these new findings are important, but they do not affect the accuracy of our description of the ways in which DNA sequences have been used to update and correct taxonomic trees.
9780133176407	Student	Big Book	Factual Error	552	About 4, NOT 4.2, billion years ago, Earth cooled.....)	Pearson is disputing this error.  The reviewer does not cite a reference for his/her assertion that the Earth first cooled at "about 4" billion years ago. Published studies indicate that liquid water was on the surface of the primitive earth by 4.3 billion years ago (Mojzsis et al [2000] Nature 409: 178-181). We note that several estimates exist for when the surface of the Earth first cooled enough to allow for the presence of liquid water, so the text statement that this occurred "About 4.2 billion years ago" is not an error, but just one of many such figures that may be drawn from the literature.
9780133176407	Student	Big Book	Factual Error	552	"many basic building blocks of life form naturally" THROUGHOUT THE UNIVERSE, RATHER THAN "in our solar system	Pearson is disputing this error.  The text is not mistaken. The sentence in our text reads: "We now know that many basic building blocks of life form naturally in our solar system." This statement is correct, and the fact that similar compounds have also been detected in interstellar space (Y-J Kuan et al. 2003 Astrophys. J. 593: 848), while interesting, is not directly relevant to the origin of life on Earth, which is the topic of this paragraph. Therefore no change in the text is necessary.
9780133176407	Student	Big Book	Factual Error	449	Page 449 SERIOUSLY MISREPRESENTS THE BALANCE BETWEEN GRADUALISM AND SUDDEN APPEARANCE IN THE FOSSIL RECORD. RATHER THAN AS STATED IN PARAGRAPH "Gradualism" AS "sometimes" AND IN PARAGRAPH " Punctuated Equilibrium" AS "Now and then," AS THE FOSSIL RECORD IS EXPANDED IT IS BECOMING QUITE CLEAR THAT STASIS FOLLOWED BY SUDDEN APPEARANCE IS THE PREDOMINANT PATTERN.	Pearson is disputing this error.  We believe that this criticism applies to page 549 of our text, not page 449 as noted on the spreadsheet.  This criticism is without merit. Detailed studies show clearly that abundant examples of stasis, gradual change, and rapid change can all be found within the fossil record. For example, Bruce J. MacFadden's authoritative study of the evolution of the horse (MacFadden, B. J. [2005] Fossil Horses – Evidence for Evolution. Science 307: 1728-1730) noted the extensive nature of the equine fossil record and commented that "The tempo of this morphological evolution has sometimes been slow and at other times rapid." Similarly, as noted in a 2011 publication, both "are valid models for understanding macroevolution because some lineages are best explained by phyletic gradualism, some by punctuated equilibrium, and some by both." (Saylo, M. C. et al [2011] Punctuated Equilibrium vs. Phyletic Gradualism. International Journal of Bio-Science and Bio-Technology 4: 27-41).  Our text has accurately presented both models for the mode and tempo of evolutionary change, and no changes are necessary.

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9780133176407	Teacher	Big Book	Factual Error	753	<p>Page 753 THE STATEMENT IN PARA "The Cambrian Explosion" THAT "Some Cambrian Fossils are classified as ancient members of modern invertebrate phyla" THE CORRECT STATEMENT WOULD BE "Most Cambrian Fossils....."</p>	<p>Pearson is disputing this error.</p> <p>The reviewer's statement is not correct, given the continuing uncertainty about the nature of many Cambrian fossils. We would direct the reviewer's attention to Budd &amp; Jensen [2000] "A critical reappraisal of the fossil record of the bilateral phyla," Biological Reviews 75: 253-295. As these authors note:</p> <p>"It has long been assumed that the extant bilaterian phyla generally have their origin in the Cambrian explosion, when they appear in an essentially modern form. Both these assumptions are questionable. A strict application of stem- and crown-group concepts to phyla shows that although the branching points of many clades may have occurred in the Early Cambrian or before, the appearance of the modern body plans was in most cases later: very few bilaterian phyla sensu stricto have demonstrable representatives in the earliest Cambrian."</p> <p>Our text, therefore, is correct.</p>
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9780133176414	Teacher	Big Book	Factual Error	547	<p>In "Address Misconceptions" suggests evolution proceeds by "natural selection." However "natural selection" is only the purifying aspect of the process. The critical aspect is introduction of novelty. It is gradually being recognized that no mechanism for this has been firmly established. See "Evolution: A view from the 21st century," James A. Shapiro, Prof of Biochemistry and Molecular Biology, Univ. of Chicago, (2011), page 144, "Selection operates as a selective but not a creative force.</p>	<p>Pearson is disputing this error.</p> <p>It appears that the reviewer may have taken this statement out of context, implying that it suggests that evolution proceeds only by natural selection. The actual wording of this note in the Teacher's Edition is: "Some students may have the idea that in order for the theory of evolution by natural selection to be valid, evidence of a complete unbroken chain of fossil organisms will have to be pieced together one day." It should be clear that this phrasing simply identifies the theory of evolution as "evolution by natural selection," which is a commonly used term. The reviewer's quotation from Shapiro, therefore, does not apply. In addition, several mechanisms for the generation of evolutionary novelty have indeed been "firmly established." As examples, the reviewer might consult these papers:</p> <p>Long, M. [2001] Gene duplication and evolution. Science 293: 1551a.</p> <p>Deng, C. et al [2011] Evolution of an antifreeze protein by neofunctionalization under escape from adaptive conflict. PNAS 107: 21593-21598.</p>
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9780133176414	Teacher	Big Book	Factual Error	466	<p>PARAGRAPH "The Age of the Earth" PRESENTS A VERY OUTDATED VIEW. Even up to the middle of the 20th century the available fossil record made a long drawn out and gradual evolutionary process seem to adequately fit the data. Now abundant data make it clear that evolution appears to occur in short periods of time, geologically speaking. The biggest known evolutionary event, The Cambrian Explosion, took on the order of only 10 million years or less. Following Eldridge and Gould the default understanding has become stasis followed by rapid appearance, Punctuated Equilibrium. That this book has failed to make the move to a 21st century understanding of the fossil record is made clear by statements that no longer are relevant such as an "Earth about 4.5 billion years old-which allows plenty of time for evolution." This can be seen by the elaborate treatment of the development of early Darwinian theory, almost 20 pages, pp 448 to 467, which is certainly an interesting example of how evolutionary science developed. The dated nature of the presentation is further reflected by the weakness of treatment of where evolutionary science is today. The Cambrian explosion is buried in only two paragraphs on page 753. Punctuated Equilibrium is given only two paragraphs on page 549 and these represent either an unbelievable uninformed understanding of the current view of the prevalence of stasis and sudden appearance or a deliberate attempt to avoid letting students know about the challenges that are making the advance of evolutionary theory so exciting today. The Neo Darwinian Synthesis doesn't appear in either the Glossary or the Index.</p>	<p>Pearson is disputing this error.</p> <p>The reviewer's comment that the second paragraph on this page presents a "very outdated view" is simply not correct. Our text properly states that Charles Darwin realized that the evolutionary processes he observed would have taken a very long time to produce the present diversity of life on Earth. Darwin himself estimated that such changes might take several hundred million years, and therefore he was disheartened by estimates made by Lord Kelvin (William Thompson) and others that the Earth might be no older than 20 million years. As the paragraph in our text properly states, the discovery of radioactivity made it possible to determine the age of the Earth scientifically, and once this was done it became clear that more than enough time had elapsed for evolution to take place.</p> <p>The reviewer then lists a long series of comments and criticisms that do not apply to the information on this page. Contrary to these comments, the Cambrian "explosion" is not "buried" on a single page (p. 753). It is highlighted on page 560, defined as a period of 54 million years on page 542, included in extinction data on page 548, discussed with respect to plant life on page 639, and then treated in detail on pages 752 and 753. It is described again with respect to the origins of Chordates on pages 757, 758, and 759. It is also included in review and discussion questions on pages 756, 775, 776.</p> <p>The reviewer's comments on the "Neo Darwinian Synthesis" are not relevant, since this concept is not called for in the TEKS, and applies to an older understanding of the evolutionary process. We have previously explained and documented the fact that punctuated equilibrium does not characterize the whole of the fossil record, so these criticisms are likewise misplaced. Finally, the reviewer asserts that the rapid diversification of life in the Cambrian took just 10 million years. While such a period might be considered "rapid" in the metaphorical sense of deep time, it is worth noting that the most recent estimates of the Cambrian diversification suggest that it actually took place from 541 to 515 million years before present, a time span of 26 million years. (See, for example, Smith &amp; Harper [2013] Causes of the Cambrian Explosion. Science 341: 1355-1356.)</p>
9780133176414	Teacher	Big Book	Factual Error	547	<p>In "Address Misconceptions" suggests evolution proceeds by "natural selection." However "natural selection" is only the purifying aspect of the process. The critical aspect is introduction of novelty. It is gradually being recognized that no mechanism for introducing novelty. THE CURRENT UNDERSTANDING OF THE GROWING BODY OF EVIDENCE IS THAT NATURAL SELECTION ONLY PURIFIES BUT SOMETHING ELSE IS REQUIRED TO CREATE SIGNIFICANT VARIANTS TO BE SELECTED. The critical aspect is introduction of novelty. It is gradually being recognized that no mechanism for this has been firmly established. See "Evolution: A view from the 21st century," James A. Shapiro, Prof of Biochemistry and Molecular Biology, Univ. of Chicago, (2011), page 144, "Selection operates as a selective but not a creative force. THE CURRENT UNDERSTANDING OF THE GROWING BODY OF EVIDENCE IS THAT NATURAL SELECTION ONLY PURIFIES BUT SOMETHING ELSE IS REQUIRED TO CREATE SIGNIFICANT VARIANTS TO BE SELECTED. The critical aspect is introduction of novelty. It is gradually being recognized that no mechanism for this has been firmly established. See "Evolution: A view from the 21st century," James A. Shapiro, Prof of Biochemistry and Molecular Biology, Univ. of Chicago, (2011), page 144, "Selection operates as a selective but not a creative force.</p>	<p>Pearson is disputing this error.</p> <p>This comment from the reviewer duplicates similar comments made previously regarding page 547. Therefore, our response is similar as well. The text does not state that natural selection introduces novelty into the evolutionary process, and therefore is correct as it stands. In addition, the reviewer is incorrect in asserting that "no mechanism" is known that can "create significant variants to be selected." We provided a list of several papers in our response to the first comments on this page that should answer the reviewer's objections with respect to evolutionary novelty. The reviewer might also find these examples interesting as well:</p> <p>Wirgin et al [2011] Mechanistic basis of resistance to PCBs in Atlantic tomcod from the Hudson River. Science 331: 1322-1325.</p> <p>Long, M., et al [2003] The origin of new genes: Glimpses from the young and old. Nature Reviews Genetics 4: 865-875.</p>

9780133176407	Student	Big Book	Factual Error	484	IN PARA "Mutations" STATEMENT "Some mutations may lower fitness...." TO CORRECT AND REFLECT THE LONG WELL KNOWN SITUATION SHOULD READ, "Most mutations led to defective offspring while some may only lower fitness...."	<p>Pearson is disputing this error.</p> <p>The assertion that "most mutations led to defective offspring" is absolutely incorrect.</p> <p>In reality, most mutations do not affect phenotype directly, and therefore are neither beneficial nor deleterious. Of those that do affect phenotype, it is true that most are deleterious, so the actual wording of the text, that "some mutations may lower fitness," is correct.</p>
9780133176407		Big Book	Factual Error	465	The introductory paragraph in 16.4 "Evidence of Evolution" titled, "THINK ABOUT IT" is quite misleading. It does mention molecular biology but by and large the implication from molecular biology insofar as "evidence" is concerned is missing from this text. As discussed elsewhere, issues raised by discordance in molecular and taxonomic trees at least got acknowledgement in the 2004 Edition, see p 865. This specifically contrasts with the treatment of the "Molecular Homology of in Hoxc8" which attempts to support the factual error that molecular systematics fully support previously developed taxonomic trees. Given this omission and the degrading of definition of evolution from that in the 2004 Edition it is not just misleading but dishonest to say in this introductory paragraph that, "Astonishingly, every scientific test has supported Darwin's basic ideas about evolution." What is astonishing is that this text that does so well in presenting recent molecular understanding of the design and function of so many complex biological systems goes so far to obscure the evolution of evolutionary theory after mid 20th century. This is really an indirect denial of the point which TEKS 2 (C) (v) is asking to be covered.	<p>It is not clear what the specific nature of the reviewer's objection is to the <i>Think About It</i> paragraph. In that paragraph we point out that fields such as geology, paleontology, and embryology have continued to advance since Darwin's time, and that new data from such fields have provided any number of ways to test the basic outlines of the theory of evolution. This is obviously true.</p> <p>The reviewer seems to take issue with our statement that "every scientific test has supported Darwin's basic ideas about evolution," and claims that we have been both "misleading" and "dishonest." The reviewer's observation of discordance between molecular and taxonomic trees is not a contradiction of "basic ideas about evolution," but merely a reflection of the fact that newer, more powerful tools have altered our understanding of the relationships of living organisms by making them more accurate.</p> <p>In order to thoroughly convey here, as we have in dozens of other places throughout our text, that evolutionary science is a living and breathing field of study, we are going to modify the final sentence in this <i>Think About It</i> section to better illustrate that a variety of scientific tests continue to refine our understandings of the mechanisms of evolution. We will change the final sentence to the following: "Although it is clear that a great deal about evolution remains to be learned, every scientific test to-date has supported Darwin's basic ideas."</p>
9780133176414	Teacher	Big Book	Factual Error	554	In the "RNA World" section the next to last sentence is wrong. The correct statement would be "complex molecules like RNA can be formed in carefully controlled laboratory experiments in the absence of life that in a limited sense contain "information." However, none of these experiments resulted in the specified, coded information required to replicate."	<p>Pearson is disputing this error.</p> <p>The next to last sentence in this section reads as follows: "experiments have shown that complex molecules like RNA can form in the absence of life, replicate, and carry information." The reviewer objects to this, claiming that "none of these experiments resulted in the specified, coded information required to replicate." This claim of the reviewer is not correct.</p> <p>In fact, exactly such a result was reported in this study:</p> <p>Lincoln, T. A., and Joyce, G. F. et al [2009] Self-sustained replication of an RNA enzyme. <i>Science</i> 323: 1229-1232.</p> <p>This and other studies have shown very clearly that selection experiments can indeed result in the specified, coded information required to replicate. The wording in our textbook is correct as it stands.</p>

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9780133176414	Teacher	Big Book	Factual Error	558	Finding complex structures of proteins that resemble other complex structures certainly is not an explanation for the origin of either.	<p>Pearson is disputing this error.</p> <p>One of the basic mechanisms of evolutionary change is known as exaptation, a process in which structures, pathways, and even molecules are altered and repurposed for new functions. TEKS 7 (G) requires that students "analyze and evaluate scientific explanations concerning the complexity of the cell." In order to help students fulfill this expectation, we pointed out the complexity of cellular structures such as cilia and flagella. We then explained that protein and genetic homologies strongly suggest that these multipart systems were formed by the combination of individual components, originally used for other purposes in the cell. This is indeed a major mechanism by which evolutionary processes have generated cellular complexity.</p> <p>This process has been described in popular form in a 2008 article (Jones, D. [2008] "Engines of Evolution." New Scientist 197: 40-43).</p>
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9780133176414	Teacher	Big Book	Factual Error	768	<p>DNA studies have not "enhanced" the picture of our species past. Recent DNA sequence studies show considerable discordance. See Sarah Reardon, New Scientist March 16-20, 2012, p 12. "the remaining 30 percent of [the gorilla's] genome turned out to be more closely related to humans or chimp than those species are to one another..."</p>	<p>Pearson is disputing this error. DNA studies have indeed enhanced our understanding of our species' past, and the very research cited by the reviewer is a case in point. The Sarah Reardon New Scientist article to which the reviewer refers describes research published in a recent issue of Nature (Sally, A, et al [2012] Insights into hominid evolution from the gorilla genome sequence. Nature 483: 169-175.). As we are sure the reviewer realizes, genetic data have long indicated that Homo sapiens is closely related to both the gorilla and the chimpanzee. The detailed genetic analysis reported in this paper sought to clarify the nature of the differences between these three species and to define their evolutionary relationships. The reviewer cites a "discordance" of such studies, supporting that claim with a quote indicating that 30 percent of the gorilla genome is more closely related to humans or to chimpanzees than those species are to one another. That statement is true, but it is not evidence of a "discordance" that might pose a problem for evolution.</p> <p>The reviewer may not have read the original scientific paper in Nature, or a review article in the same issue describing the results (Gibbs, R, and Rogers, J. A. [2012] Gorilla gorilla gorilla. Nature 483: 164-165). Both of these scientific reports place the study in a context that might have been missing from the more general report in the New Scientist. As the researchers note, when species divergence takes place over a relatively long time in small populations, a phenomenon known as incomplete lineage sorting (ILS) may take place. In line with such expectations, for 70% of the genes studied in the three species the human and chimpanzees display the greatest similarities. This confirms that the human-chimpanzee split occurred more recently than the split that gave rise to modern gorillas.</p> <p>As the studies noted, this was not the case for about 30% of the gorilla genome. These genes were actually more closely related to chimpanzee genes than the chimpanzee genes were to human ones, or more closely related to human genes than the human genes were to chimpanzee ones. ILS explains these results. If the common ancestor of all three species carried a gene with two or more sequence variants, one of those variants may be lost from either lineage after a split resulting in speciation. In the specific case of a sequence variant that might have been lost from the chimpanzee line after it split from the human line, this would result in a set of human sequences that are, on average, closer to the gorillas sequences that also contain the sequence variant that had been lost in chimpanzees.</p> <p>Returning to the issue of accuracy, we may ask whether: "These new data have enhanced the picture of our species' past" as stated in our text. The scientists who carried out this work certainly believe that this is the case. As Gibbs &amp; Rogers [2012] note, the results provide new "insight into how a single hominid lineage separated into the extant human, chimpanzee and gorilla branches." We would argue that this is very much an enhancement of our understanding of our species' past, exactly as our textbook states.</p>
9780133176407	Student	Big Book	Factual Error	768	See Teacher	<p>Pearson is disputing this error.</p> <p>See our answer for page 768 of the Student Edition, below</p>

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9780133176414	Teacher	Big Book	Factual Error	768	<p>Scientific American, Feb., 2013, p42, "Shattered Ancestry" shows four of the seven genera cited under "Relatives vs. Ancestors" should be considered to lie outside the direct ancestry of humans. These are <i>Shelanthropus</i>, <i>Orrorin</i>, <i>Paranthropus</i> and <i>Kenyanthropus</i>. It should be noted that the Fig. 26-19 is more in line. "Shattered Ancestry" makes it clear that there is a major discontinuity in the hypothetical line. The break, the saltation, comes at about the 2 mya (million years ago) mark, a "period of very rapid evolution" characterized by swelling brain size and sweeping physiological reengineering. For example, Ernst Mayr, a leading figure in evolutionary biology, stated in "What Makes Biology Unique" (Cambridge University Press), P 198, that, "The earliest fossils of <i>Homo</i>, <i>Homo rudolfensis</i>, and <i>Homo erectus</i>, are separated from <i>Australopithecus</i> by a large, unbridged gap."</p>	<p>Pearson is disputing this error.</p> <p>Our response here also applies to the Teachers Edition on page 768, as noted above by the review.</p> <p>The reviewer cites a Scientific American article that depicts four genera as lying "outside the direct ancestry of humans." It is worth noting that not all scientists agree with that assessment, and that the exact line of human ancestry is very much in doubt, as we took care to point out in the "Relatives vs. Ancestors" paragraph. As we wrote on page 768, "Distinguishing relatives from ancestors in the hominine family is an ongoing challenge," and "Some early hominine fossil species seem to belong to the lineage that led to modern humans, while others formed separate branches off the main hominine line." Since this is exactly the point of the Scientific American article, it is not clear why the reviewer considers this to be an error in need of revision.</p> <p>The reviewer describes Figure 26-19 as being "more in line." It's not clear what is meant by that comment, unless it is to note that Figure 29-19 is an absolutely accurate representation of the state of the pre-human fossil record.</p> <p>Curiously, the comments of the late Ernst Mayr are presented as though they challenged the picture in our textbook, which they clearly do not. They do, however conflict with the previously cited Scientific American article regarded as authoritative by the reviewer. The image on page 46 of that article depicts a direct lineage leading from <i>Australopithecus afarensis</i> to "early <i>Homo</i>." We would suggest that our textbook actually depicts the true state of affairs with respect to pre-human paleontology. As we wrote on page 769:</p> <p>"Researchers once thought that human evolution took place in relatively simple steps in which hominine species, over time, became gradually more humanlike. But it is now clear that a series of hominine adaptive radiations produced a number of species whose relationships are difficult to determine. As a result, what once looked like a simple hominine "family tree" with a single main trunk now looks more like a shrub with multiple trunks."</p> <p>These "multiple trunks" accurately reflect the current state of research on human origins. The text is accurate, and no changes are required.</p>
9780133176407	Student	Big Book	Factual Error	768	See Teacher	<p>Pearson is disputing this error.</p> <p>See comments above.</p>



9780133176407	Student	Big Book	Factual Error	472	Fails to report that the Grants have documented that beak sizes oscillate with a lag in response to climactic conditions and this is only an example of genetic drift within a species.	<p>Pearson is disputing this error.</p> <p>The reviewer misstates the work of Peter and Rosemary Grant with respect to beak sizes of the Galapagos finches. These pioneering scientists did not attribute changes in beak sizes solely to "genetic drift." Rather, as the text properly describes, these changes were directly correlated to shifts in climate, rainfall, food abundance and other factors that drive natural selection.</p> <p>Furthermore, the Grants have recently documented some of the critical stages of speciation, the key event in the origin of new species, in these very same finches. Therefore, the reviewer's claim this is "only" an example of genetic drift within a species is not valid. (Reference: Grant, P. R., and Grant, B. R. [2009] The secondary contact phase of allopatric speciation in Darwin's finches. PNAS 106: 20141-20148.).</p>
9780133176414	Teacher	Big Book	Factual Error	365	Statement "What is the purpose of making a large RNA molecule and then throwing parts of molecule away?" is not as unanswered as this wording implies. This is a veiled reprise of the discredited "junk DNA" issue that fails to recognize the results of the ENCODE project. It is a misleading analogy of the propaganda effort shown by the replacement of discredited "Peppered Moth" misrepresentations with a hypothetical green grasshopper story. See comment on Line 278, TEKS 7(c) (ii) Further, if there is any basis for the statement "Introns and exons may also play a role in evolution making it possible for many small changes in DNA sequences to have dramatic effects on how genes effect cellular function" some sort of reference should be supplied. No creative capability has been demonstrated for the effect other than helping to explain how such a vast array of proteins can be produced. The vast majority of "small changes" are highly deleterious and to date no small change has been identified creating a beneficial "dramatic effect." This is the reason reporting on the Altenberg conference in "Nature" noted "Natural selection can explain the survival of the fittest but not the arrival of the fittest."	<p>Pearson is disputing this error.</p> <p>We are baffled by the accusation that the wording of our text is somehow a "veiled reprise" to "junk DNA". Curiously, the reviewer also raises the issue of "Peppered Moth" studies, which do not appear in our textbook, calling them "misrepresentations."</p> <p>The reviewer also challenges the notion that introns and exons might play a role in evolution, and demands that "some sort of reference should be supplied." A clear example of what the reviewer requires is already present in the text on page 435, the Technology &amp; Biology feature on "Natural Genetic Engineering." On that page we describe the ways in which exon shuffling and duplication have resulted in the evolution of a novel protein known as TPA (tissue plasminogen activator).</p> <p>The reviewer's final comments about the efficacy of natural selection and the "arrival of the fittest" seem to be misplaced, since they do not apply to any of the content on page 365. Therefore no changes on this page are required.</p>
9780133176414	Teacher	Big Book	Factual Error	557	The Krebs Cycle - Contains the logical fallacy, which appears at other places in the text, that borrowing a function somehow suggests an explanation for the origin of the function in the first place.	<p>Pearson is disputing this error.</p> <p>We disagree. As the text clearly states, no function is being "borrowed" in our description of the evolution of the Krebs cycle. Rather, it is now clear that each of these enzymes were derived from genes that were altered and repurposed to establish an entirely novel biochemical pathway. This is exactly the sort of explanation required by TEKS 7 (G), as we have noted earlier.</p>

9780133176414	Teacher	Big Book	Factual Error	760-761	<p>The placement of Tiktaalik as an important link in chordate evolution is outdated and contradicted by its relationship to Panderichthys. See "Nature, Catherine A. Boisvert, Elga Mark-Kurk, &amp; Per E. Ahlberg, "The pectoral fin of Panderichthys and the origin of digits," Fig. 2d (Sept. 21, 2008))"</p> <p>One of the paper's co-authors Per Ahlberg said that if Tiktaalik were to remain the form that is closer to tetrapods, then "finger development took a step backward with Tiktaalik, and that Tiktaalik's fins represented an evolutionary return to a more primitive form."</p> <p>Furthermore, recent findings show the timing of Tiktaalik is 20 million years too late to be the link suggested. See John Roach for National Geographic News, January 6, 2010.</p> <p>The first vertebrates to walk the Earth emerged from the sea almost 20 million years earlier than previously thought, say scientists who have discovered footprints from an 8-foot-long (2.4-meter-long) prehistoric creature. 395-million-year-old fossil footprints discovered on a former marine tidal flat or lagoon in southeastern Poland were made 20 million years prior to the fossil Tiktaalik erroneously cited in Figure 26-20 as a transitional fossil to tetrapods.</p>	<p>Pearson is disputing this error. Our descriptions of the place of Tiktaalik in the chordate fossil record are not in error. The reviewer may have misunderstood the diagram on pages 760-761 (Figure 26-9). It does not represent a straight-line lineage in which Panderichthys is the direct ancestor of Tiktaalik, which in turn is the ancestor of Acanthostega. Rather, each of these forms is shown as an offshoot of the main lineage, indicating the possibility that they are merely representative of other species living at the same time. This means that we have not presented Tiktaalik, or any of the other fossils shown in Figure 26-9 as direct ancestors in the evolution of tetrapods, which is the generally accepted way to present such information.</p> <p>The Boisvert et al [2008] paper, based on a reexamination of the pectoral fins of Panderichthys, showed that digit-like structures did indeed exist within the pectoral fins of these organisms. Therefore, the basic rudiments of fingers were already present in these lobe-finned fish, which strongly confirms the inference that tetrapods evolved from such fish in the Devonian period, just as our book reports. However, this does not render the phylogeny in Figure 26-9 incorrect or "obsolete," as the authors of the study themselves note. Their concluding sentence makes this point clear: "It is difficult to say whether this character distribution implies that Tiktaalik is autapomorphic, that Panderichthys and tetrapods are convergent, or that Panderichthys is closer to tetrapods than Tiktaalik. At any rate, it demonstrates that the fish-tetrapod transition was accompanied by significant character incongruence in functionally important structures."</p> <p>The other study cited by the reviewer is a new report in a popular magazine (National Geographic). It refers to a study by Niedzwiedzki et al [2010] (Nature 463: 43-48) of trackways dating to the Devonian period. However, two important points seem to have been overlooked by the reviewer. First, it is not clear what sort of organism made these tracks. While the authors of the study argued that they were produced by tetrapods, others have presented evidence that such tracks were made by lobe finned fish instead (see, for example, King et al [2011] Behavioral evidence for the evolution of walking and bounding before terrestriality in sarcopterygian fishes. PNAS 108: 21146-21151.). Therefore, it is not clear that the tracks in question in any way invalidate the status of Tiktaalik as a transitional form.</p> <p>Second, fossils of a "transitional form" need not be found at an exact time point in the past between ancestral and descendant forms to qualify as transitional. Even if specific fossil specimens of Tiktaalik date to a point in time slightly after the earliest tetrapods, they may still be indicative of the morphologies of actual ancestral forms that gave rise to such tetrapods, and therefore would still be considered transitional.</p> <p>The research cited supports our treatment of evolutionary transition.</p>
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