

Errata/Update Sheet for 1st Edition of *Explore Evolution* [as of 10/31/08]

Please send suggestions for further corrections or updates to questions@exploreevolution.com.

Page #	Errata/Update
vi, ln 8	Updated text: "has previously recommended that pupils "should be taught how scientific controversies can arise from different ways of interpreting empirical evidence," and currently recommends "that pupils should be taught how uncertainties in scientific knowledge and scientific ideas change over time, and about the role of the scientific community in validating these changes.""
19, col. 1, ln 9	"connecting a dot from one line" should be "connecting a point along one line."
22, col. 1, ln 2	"4 inches" should be "8 inches."
27, col. 1, ln 1	Change to: "Though a possible transitional sequence from land-dwelling mammal to fully aquatic mammal has recently been uncovered, critics maintain that transitional sequences are rare, at best."
28	Updated text: "The first four-footed creatures (called <i>tetrapods</i>) appear in the geological period called the Late Devonian (370 to 354 million years ago). According to most evolutionary biologists, the first land-dwelling tetrapods evolved from fish. However, fossils having inbetween (or <i>intermediate</i>) features between fish and tetrapods have long been elusive, and almost all of the known fossils fell pretty squarely into the fish category or into the tetrapod category. Then, in 2006 came a discovery in the Canadian Arctic: a fossilized species, named <i>Tiktaalik</i> by palaeontologist Neil Shubin. According to Shubin, <i>Tiktaalik</i> had fish-like fins but also a wrist-like feature that looked as though it could support weight like a leg does. Because of this feature (and others), Shubin argued that <i>Tiktaalik</i> was the very type of transitional form between fish and tetrapods that palaeontologists had long been looking for. Let's take a look and see what you think. Shubin has produced a branching diagram called a <i>cladogram</i> (shown right) which depicts his evolutionary hypothesis about how fins gradually transformed into limbs. He compares <i>Tiktaalik's</i> "wrist-like" appendage to the fins of several fish and to the legs of some of the first tetrapods. For Shubin, one key feature is the presence of some small bones called <i>radials</i> at the end of <i>Tiktaalik's</i> "wrist." Notice that <i>Tiktaalik</i> has radials just like the tetrapods do. However, you should also notice that several of the fishes have radials in their fins. So, does <i>Tiktaalik</i> have the bone structure of a foot or a fin? How could you be sure? We think it's difficult to tell. Maybe future fossil finds will settle the issue. One more issue. If one animal in this cladogram is the forerunner of the next one in line, one might expect to find these fossils in the same geographical location. But we don't. Instead, the animals in this "transitional" sequence were found far from one another, often separated by thousands of miles of open ocean. Moreover, each individual tetrapod species is typically found in one location—and one location only. This has led some scientists, such as John Long of Museum Victoria in Australia and Malcolm Gordon of UCLA, to wonder if tetrapods may have originated multiple times, independently, in different locations."
44, col. 2, ln 3	"The vertebrate gut" should be "The chordate gut."
52, col. 1, ln 20	Should read: "Proteins are extremely important because they are used to build cellular structures"
52, footnote	Should read: "Two more protein-forming amino acids—selenocysteine and pyrrolysine—have recently been identified in some (but not all) organisms. This brings the total of known protein-forming amino acids to 22. This discovery is so new that most biologists still refer to a 20-amino acid alphabet."
60, col. 1, ln 14	Change to: "They have been surprised to learn that a large number of genes are unique to the organism in which they are found, and code for proteins whose function we don't understand yet."
66, footnote	Change to: "continuing until birth or hatching."
68, col. 2, ln 3	Change "what he called" to "what is now called."
81, ln 16	Change to: "In this section of the book, we will present the two main arguments used to support the creative power of natural selection: the analogy to artificial selection, and microevolution extrapolated."
93-94	Add update: "Some biologists continue to defend the classic peppered moth story. For example, in 2007 Cambridge University biologist Michael Majerus began by observing moths in his back garden. He concluded that 37% of peppered moths <i>do</i> rest on tree trunks, and that therefore the classic story is still sound. But Majerus himself acknowledged that his results may have been "biased towards lower parts of the tree, due to sampling technique" (http://www.gen.cam.ac.uk/Research/majerus.htm). In other words, by his own admission, if most moths rest high up in the trees he wouldn't have seen them from the ground, and his 37% statistic would be meaningless (http://www.discovery.org/a/4198).
98, col. 2, ln 20	"is copied twice" should be "could be copied twice."

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99, sidebar	Updated text: "Let's look at a medically important mutation in the oxygen-carrying protein called <i>hemoglobin</i> . A point mutation at a single position on the gene causes a valine amino acid to be inserted where a glutamine should have gone. A person carrying two copies of this mutation (one inherited from the father and one from the mother) develops <i>sickle cell anemia</i> . This painful disease distorts many of the person's red blood cells—see the photo—which can block the tiny capillaries that deliver blood (and oxygen) to the tissues. The average life expectancy of people with sickle cell anemia is about 45 years.* However, scientists point out that this same mutation can be beneficial in a region where malaria is common. People who have only one copy of the mutated gene (they are said to have <i>sickle cell trait</i>) may go through their whole lives symptom-free. However, their otherwise normal-shaped red blood cells begin to distort into the sickle shape when invaded by the malaria plasmodium. Though other factors are involved, and much is still unknown, research indicates: a) that the misshapen cells tend to leak potassium (depriving the parasite of food), and b) that sickle shaped cells are more likely to be filtered out and destroyed as the blood circulates through the spleen—destroying the parasite, too. In this way, people with this single point mutation have a selective advantage over people without the mutation. (Unfortunately, if two people with sickle cell trait marry, their children <i>will</i> develop sickle cell anemia.)"
100, col. 2, ln 5, 11	"Antibiotic agents attack" should be "Some antibiotic agents attack"; "Antibiotics poison" should be "These antibiotics poison."
103, col. 2, ln 14	"dies off within a few generations" should be "soon declines drastically in number."
107	The authors have discovered that material on this page from biologist David Menton was inadvertently reproduced without attribution. As a result, they are drafting new text for a second edition. See David Menton, Ph.D., "The Hopeful Monsters of Evolution," <i>St. Louis MetroVoice</i> , June 1994, Vol. 4, No. 6.
111, col. 1, ln 13	Change to: "But new research seems to say that mutations in DNA assembly instructions will produce, at best, a new protein or an alteration in the expression of protein-coding genes."
121, col. 1, ln 21	Updated text: "Some biologists have analysed the genes and proteins found in both the cellular pump and the bacterial motor and think that the proteins in the motor are likely older than those in the pump. Accordingly, they have argued that, if anything, the pump "devolved" from the motor, not the reverse. Also, as you recall, the bacterial flagellar motor is a molecular machine with about 30 structural protein parts. Proponents of the molecular machine argument point out that while roughly 10 of these 30 proteins are found in the needle-nosed pump, present analyses indicate that at least half of the remaining flagellar proteins are unique to the flagellum and not found in any other system. So co-option's critics ask, where is co-option going to 'borrow' these from? Another possibility, say some critics, is that the needle-nose pump has neither devolved nor been co-opted. Instead, they claim that the flagellar motor and the needle-nose pump have completely independent origins, and that neither one is an ancestor of the other. They point specifically to the protein components of the needle assembly, used to inject toxins into the host. The tip proteins at the end of the 'needle complex' are involved in sensing when a suitable host is nearby—and this system may, itself, be irreducibly complex. (In the absence of these "capping proteins," the pump ceases to function.) Because recent research indicates that several of the capping proteins in the needle-nose pump do not have homologues with flagellar proteins, some scientists say this supports the hypothesis of the independent origin of the two systems."
128	Updated text under "Two Transformations" subheading: "In neo-Darwinian theory, mammals and birds are both supposed to have descended from an unspecified common ancestor, widely thought to have had at least <i>some</i> reptilian characteristics. However, modern birds and modern mammals are significantly different from reptiles in their anatomy and physiology. These differences raise some difficult questions. How do new anatomical structures arise from old ones, for example? Unfortunately, we cannot directly examine the anatomy and physiology of the extinct reptile-like "ancestor." Nor can we directly compare them to the anatomy and physiology of mammals or birds. However, we can get some idea of the difficulty of changing a reptile-like ancestor into a mammal or bird by asking what it would take to transform the anatomical structures found in modern reptiles into structures we see in modern mammals and birds."
129, ln 17	Change to: "most mammals carry fertilized eggs internally in a uterus, nourished by a placenta..."
129, ln 25	The section starting with "The venus system" should be replaced with: "The <i>pulmonary</i> system receives deoxygenated blood from the body and pumps it to the lungs to be "recharged" with oxygen. The <i>systemic</i> system receives oxygenated blood from the lungs and pumps it back out to the body."
131	Three-chambered heart diagram: The arrow in the blue vein in the upper right corner of the image is pointing the wrong way. (That vein contains "spent" blood returning to the heart.)
133, ln 24	Delete: "You already know about the bird's sternum—except you probably call it the wishbone."
144	Change first 7 words of definition of allele to: "one of a number of different forms of a gene, found at a given location (locus) along a chromosome."
148	Change definition of stator to: "a stationary part of a motor; the stator remains fixed while the rotor spins within it."