

Critical Analysis of Evolution: Definitions

The lesson plan presents definitions for key terms which are not those used by practicing scientists. By using these erroneous definitions to help structure the lesson, the author attempts to make unsupported ideas equivalent to established scientific theories, and to raise the appearance of controversy and challenge where none exists. The incorrect or misleading definitions muddy the clear distinctions between the scientific investigation of the natural world and the pseudo-science propaganda promoted by the philosophy of Intelligent Design Creationism regarding the supernatural world. The confusing definitions allow the proponents of ID to insert creationist philosophy into the lesson. In addition, creating the appearance of controversy allows the author to propose that there must be alternatives outside mainstream science which need to be explored. The lesson then directs students overtly and covertly to creationist resources to “discover” these alternatives.

	Critical Analysis of Evolution – Grade 10 (Lesson: L10-H23)	Intelligent Design Creationism sources	What scientists say:
1 pp. 313 , & 316	<p>Pre-Assessment:</p> <ol style="list-style-type: none"> Describe what constitutes an anomaly. Why do anomalies exist in science? Are there any benefits to exploring scientific anomalies? <p>Student Engagement</p> <p>Anomalies are ideas in science that depart from the general consensus of the time. Many anomalies occur in science. In an effort to determine the cause of this deviation, scientists conduct research to collect data that will explain the phenomena. As the evidence mounts by careful analysis of the data, original ideas may change from one scientific understanding to another.</p>	<p><i>anomaly</i></p>	<p>Anomalies are NOT <i>ideas</i>. An anomaly in science is a set of consistent observations (data) that do not conform to the predictions of a theory. The lesson plan definition attempts to give unsupported ideas scientific merit as valid counters to established scientific theories. Without empirical support, ideas alone do not deserve attention by the scientific community.</p> <p>The section on “pre-assessment” is slanted toward “anomalies,” and does not represent the scientific process of analysis (e.g., developing predictions based on a theory and using data to test those predictions). Students are being subtly “set up” to think there are numerous, major inconsistencies in evolutionary theory, which there aren’t.</p> <p>Einstein recognized limitations in Newtonian physics and corrected them with Relativity Theory. In so doing, he did not claim to topple Newtonian ideas. Similarly, 150 years of research has not toppled Darwin’s basic concept; rather it has filled in the gaps and expanded the applicability of the theory.</p> <p>The pseudo-scientific “anomalies” presented in this lesson constitute a poorly disguised effort to promote the role of an Intelligent Designer as a replacement for the theory of evolution.</p>

2 p. 314	Theory: A supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained.	<i>theory</i>	<p>“Theory” is defined incorrectly in the lesson plan as “a supposition.” Scientists use the term “theory” to mean an explanation of a very large number of observations (facts). Thus, in science a theory is more important than a fact. When theories remain successful explanations as greater and greater numbers of facts are gathered - and when they link well with theories in other areas of knowledge, they are considered “robust.” The Theory of Evolution is one of the most robust and best supported theories in all of science.</p> <p>The lesson’s definition mischaracterizes science in the manner promoted by Intelligent Design Creationists at the Discovery Institute.</p>
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<p>3 pp. 314 , & 315 - 316</p>	<p>Macroevolution: Large-scale evolution occurring over geologic time that results in the formation of new taxonomic groups.</p> <p>Microevolution: Evolution resulting from a succession of relatively small genetic variations that often cause the formation of new subspecies.</p> <p>In addition to the distinctions between different areas of evolutionary theory, scientists also find it helpful to distinguish amounts of biological change or evolution. Microevolution refers to evolution resulting from a succession of relatively small genetic variations that often cause the formation of new subspecies. Macroevolution refers to large-scale evolution occurring over geologic time that results in the formation of new taxonomic groups. These terms are helpful distinctions in the course of analyzing evolutionary theory. These terms have appeared in OhioLink research databases, numerous Internet sites, and biology and evolution textbooks. Though “micro” and “macro” are prefixes, it is quite clear that the scientific community recognizes and acknowledges the distinction between the words. There is more research on microevolution than there is on macroevolution. To help ensure academic clarity, this lesson distinguishes between microevolution and macroevolution.</p>	<p>SEAO, “<i>The evolution controversy:</i>”</p> <p>When we speak of evolution in biology, any of several definitions may be implied. Some definitions are not problematic. For instance, evolution is commonly defined as simply “change over time.” This definition is non-controversial, as no one would disagree that the living world looks different now than it has in the past. Another well-accepted definition is “minor genetic variation,” otherwise known as microevolution. Typical examples of microevolution include drug-resistance in bacteria and variations in domestic animal breeding. While there is evidence that these minor genetic variations can produce changes within species, microevolution has not been shown to produce the new body plans and parts that would be needed if life evolved from simple to more complex forms of life.</p> <p>When biologists talk about the theory of Darwinian Evolution (or macroevolution), they have a specific definition in mind. This overall claim has generated vigorous scientific controversy for over a century:</p> <p>Darwinian evolution is the theory that all living things are related by descent with modification from common ancestors. The mechanism of modification (i.e. how these changes take place) is primarily natural selection, sometimes defined as survival of the fittest, acting on random variation in the genetic makeup of replicating systems (i.e., organisms that are capable of reproducing themselves). (Sjogren, et al., 2003, p.10)</p>	<p>Once again, the lesson plan draws a set of definitions from creationist literature rather than from the world of consensus science. Scientists most often use “microevolution” to mean local geographic variation, and “macroevolution” to mean speciation and the cascade of effects that patterns of reproductive isolation produce (e.g. species selection). Microevolution (including the impetus for the mathematical theory of population genetics) was predicted by and historically grew out of macroevolutionary theory. Thus, it would be more accurate to say that there is “more research” on macroevolution than there is on microevolution, as microevolution is a subset of macroevolution.</p> <p>The distinctions between microevolution and macroevolution at the level of mechanism are not at all clear, and this is an active area of research. There is a wide range of known evolutionary mechanisms and these operate at both the population level and in the establishment of new species. It is misleading to imply that microevolution and macroevolution represent two completely different problems with completely different and non-overlapping mechanisms. Practicing researchers in biology do not make such a distinction.</p> <p>It is significant to note that no creationist has been able to define the limits of micro-evolution (as they define the term) – because micro- and macro-evolution are both part of a single continuum.</p> <p>This mischaracterization of current evolutionary biology is promoted by the Rev. Jonathan Wells in his Intelligent Design Creationist polemic, <i>Icons of Evolution</i>, and in the Discovery Institute video by the same name.</p>
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4 p. 315	In addition to the distinctions between different areas of evolutionary theory, scientists also find it helpful to distinguish amounts of biological change or evolution.	<i>The creationist controversy</i> From the IDea Club: “the amount of biological change makes creationism a viable alternative” (http://www3.telus.net/csabc/scientific2003.htm).	This is not standard terminology. A Google search of "amounts of biological change" yielded not a single result. Changing that to "amount of biological change" brought up a few things about ecology and radiation damage, then Intelligent Design and other Creationist sites, and also a few sites on computational biology (a legitimate -though highly specialized- field of science, requiring mathematical ability far beyond high school).
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