

## **Agenda**

Special Panel of the State Board of Education and EOC  
Regarding High School Biology Standard H.B.5.

July 29, 2014

10:00 a.m.

Room 501 Blatt Building

Dr. Traci Young Cooper, Chair Elect, SBE  
Dr. Rhonda Edwards, SBE  
Dr. Danny Varat SBE  
Ms. Anne Bull, EOC  
Senator Mike Fair, EOC  
Mr. Neil Robinson, EOC

Review of Standard H.B.5.

Comments from South Carolina Department of Education



## BIOLOGICAL EVOLUTION – UNITY AND DIVERSITY

**Standard H.B.5: The student will demonstrate an understanding of biological evolution and the unity and diversity of life on Earth.**

**(In red is the additional language to be discussed on July 29, 2014)**

**H.B.5A. Conceptual Understanding:** Scientific evidence from the fields of anatomy, embryology, biochemistry, and paleontology underlie the theory of biological evolution. The similarities and differences in DNA sequences, amino acid sequences, anatomical features and fossils all provide information about patterns of descent with modification. Organisms resemble their ancestors because genetic information is transferred from ancestor to offspring during reproduction.

**Performance Indicators:** Students who demonstrate this understanding can:

**H.B.5A.1** Analyze scientific data to explain how multiple lines of evidence (including DNA or amino acid sequences, anatomical and embryological features, fossils and artificial section) are used to investigate common ancestry and descent with modification.

**H.B.5A.2** Explain how scientists use data from a variety of sources to investigate, critically analyze, aspects of the theory of biological evolution.

**H.B.5A.3** Construct and interpret a phylogenetic tree, based on anatomical evidence, of the degree of relatedness among various organisms and revise the model based on the inclusion of molecular (such as DNA and/or amino acid sequence) evidence.

**H.B.5B. Conceptual Understanding:** Biological evolution occurs primarily when natural selection acts on the genetic variation in a population and changes the distribution of traits in that population over multiple generations.

**Performance Indicators:** Students who demonstrate this understanding can:

**H.B.5B.1** Critically analyze and interpret data to explain that natural selection results from four factors: (1) the potential for a population to increase in number, (2) the genetic variation among individuals in a species due to sexual reproduction and mutation, (3) competition for a limited supply of resources, and (4) the ensuing proliferation of those individuals that are better able to survive and reproduce in that environment.

**H.B.5B.2** Conduct investigations by simulating several generations of natural selection to investigate how changes in environmental conditions may lead to changes in selective pressure on a population of organisms.

**H.B.5C. Conceptual Understanding:** According to the theory of biological evolution, natural selection results in populations that are adapted to a particular environment at a particular time. Changes in the physical environment have contributed to the expansion, emergence, or extinction of the Earth's species. Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). Modern classification of Earth's biodiversity is based on the relationships of organisms to one another.

**Performance Indicators:** Students who demonstrate this understanding can:

**H.B.5C.1** Analyze and interpret data, using the principles of natural selection, to make predictions about the long term biological changes that may occur within two populations of the same species that become geographically isolated from one another.

**H.B.5C.2.** Construct scientific arguments using data on how changes in environmental conditions could result in (1) the expansion of some species, (2) the emergence of new species over time, or (3) the extinction of other species.

**H.B.5C.3.** Use models of the current three-domain, six-kingdom tree of life to explain how scientists classify organisms, and how classification systems are revised over time as discoveries provide new evidence.

**H.B.5D. Conceptual Understanding:** Science is the systematic gathering of information through both direct and indirect observation, and the testing of this information by experimentation with the aim of developing concepts and formulation of laws and theories. Scientific conclusions are tested by experiment and observation, and evolution, as with any aspect of science, is continually open to and subject to experimental and observational testing.

**Performance Indicator: Student who demonstrate this understanding can:**

**H.B.5D.1** Explain how scientists develop theories and laws by using deductive and inductive reasoning in situations where direct observation and testing are possible and also by inference through experimental and observational testing of historical scientific claims. Students should understand assumptions scientists make in situations where direct evidence is limited and understand that all theories may change as new scientific information is obtained.