

## GEOSCIENCE NEWSLETTER

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### THIRD CONFERENCE ON TEACHING ORIGINS

Some 60 to 70 teachers, scientists and spouses gathered in Canmore, Alberta from July 29-31 to discuss ways of teaching origins in university courses. About 40 individuals gave presentations, with reports on classroom experiences, teaching materials, and recent discoveries in science.



Attendees at the Third Conference on Teaching Origins.

The Conference was preceded by a field trip to the Royal Tyrell Museum in Drumheller, which houses a spectacular display of dinosaurs. There was also a post-Conference guided field trip to visit the famous Burgess Shale quarry, and a trip to the Athabasca Glacier at Jasper National Park.



Skeleton of Tyrannosaurus rex in opisthotonic posture, indicating death by suffocation. Royal Tyrell Museum.



Dr Choi Cong Geol points to a geological feature on the field trip in Seoul.

### BRANCH OFFICE ACTIVITY

From 7-12 August, some 100 teachers and pastors gathered at SahnYook University in Seoul, Korea, for a "Conference on Creationism, Faith and Science." The Conference included a series of lectures and a field trip to examine dinosaur footprints in a stream bed. The Conference was organized by Dr Choi, Director of the GRI Branch Office for Asia. Presenters from the USA included Drs. Leonard Brand, John Baldwin, and Jim Gibson.

### A REVOLUTION IN EVOLUTION?

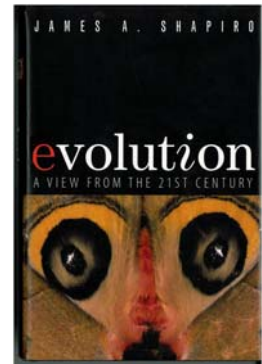
Shapiro JA. 2011. *Evolution. A view from the 21<sup>st</sup> century. Upper Saddle River, NJ: FT Press Science. 253 + xviii pages. \$34.99 list. Available online at a discount.*

The central question of this book is how evolutionary theory can explain the origin of new biological features. The standard explanation for the past 150 years is that new features arise in gradual increments through the

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mechanism of natural selection on mutations of small effect. According to the author (p 121) "selection has never led to formation of a new species, as Darwin postulated." Statements like this are bound to stimulate vigorous discussion among evolutionary biologists.

The author is James A. Shapiro, Professor of Microbiology at the University of Chicago. Shapiro was part of the team that first isolated a gene, the gene lacZ. He has also studied cooperative behavior and pattern formation in bacteria. From this background he brings knowledge of



genetic mechanisms and genomic interactions to bear on the question of biological structure. "The premise of this unconventional book is that bacteria do not have fixed specific genomes but instead share a vast genome distributed across multiple cells and virus particles" (p 94).

This is not just another rehash of standard evolutionary theory. It proposes a significant change in the way evolutionary change is understood. It is written for the academic community, but can be appreciated by anyone with a background in modern genetics. It is highly recommended for those teaching courses that include a discussion of evolutionary theory.

## SCIENCE NEWS

### Gene Duplication Questioned

Gauger AK, Axe DD. 2011. *The evolutionary accessibility of new enzyme functions: A case study from the biotin pathway*. *Bio-complexity* 2011(1):1-17. *Doi:10.5048/BIO-C.2011.1*.

**Summary.** Evolutionary theory typically explains the origins of new enzyme functions by proposing gene duplication and subsequent divergence by Darwinian mechanisms. A duplicate gene should be redundant, permitting accumulation of chance mutations until a new function is created. Enzymes with high sequence similarity are claimed to be explained through this Darwinian process.

This study examines two enzymes with significantly similar amino acid sequence but different enzyme functions. The study enzymes are members of the group of PLP-dependent transferases and were obtained from the intestinal bacterium, *E coli*. This study attempted to test whether the gene for one enzyme could be converted into the other via a series of functional intermediates. A suite of mutant enzymes was engineered, incorporated into plasmids, and inserted into a bacterial strain in which the gene had been deleted. Three groups of amino acid changes, representing a minimum of five amino acids were identified as incompatible with the target enzyme function. These form a mutational barrier to evolution of one enzyme from the other. Five amino acid changes would require seven nucleotide changes. To establish seven specific nucleotide changes by chance would require more time than the entire evolutionary history of life. This suggests that at least some enzymes with significant sequence similarity could not have evolved into their present-day forms by chance.

**Comment.** The origin of new gene functions by duplication and divergence is one of the cornerstones of evolutionary theory. Despite the popularity of the theory, there are weighty

arguments that question whether it could actually work as proposed. The results reported here add to the doubts that the theory of gene duplication can explain the differences in enzyme functions seen among living organisms.



*The house finch has changed since it was introduced into the Hawaiian islands. Photo from Wikimedia Commons. Used by permission.*

### Rapid Change in Island Birds

Mathys BA, Lockwood JL. 2011. *Contemporary morphological diversification of passerine birds introduced to the Hawaiian archipelago*. *Proceedings of the Royal Society of London B*: 278:2392-2400.

**Summary.** Several species of birds have been introduced into the Hawaiian Islands. The question studied here is to what extent these introduced species have diverged morphologically subsequent to their arrival on the islands. Six species of songbirds, from four islands, were chosen for the study. All six species have dispersed to all the major islands. Species varied in their responses. Some showed significant morphological differences, especially in decreased wing length and increased tail length. Smaller changes were seen in mass and bill size. One species, the red-billed leiothrix, showed no change

**Comment.** Rates of morphological change observed in living species are much faster than those calculated from the fossil record and the geological time scale. This is usually explained as due to fluctuating changes that reverse previous changes. If this is true, one would expect overall stasis, which is frequently observed in the fossil record. This leaves unexplained the origin of

new types of species. An alternative explanation is that species change much more rapidly than generally thought, but to a much lesser extent than assumed by evolutionary theory.

### Evidence of Paleozoic Chitin

Cody GD, Gupta NS, Briggs DEG, Kilcoyne ALD, Summons RE, Kenig F, Plotnick RE, Scott AC. 2011. *Molecular signature of chitin-protein complex in Paleozoic arthropods*. *Geology* 39:255-258.

**Summary.** Chitin is an organic molecule found with protein in the exoskeletons of arthropods. It readily undergoes microbial and chemical degradation, and is not expected to survive in ancient fossils. Some evidence of chitin has been found in Cenozoic insect fossils, but not Paleozoic or Mesozoic fossils. X-ray absorption techniques reveal evidence of vestigial chitin in a Pennsylvanian fossil scorpion and a Silurian fossil eurypterid. The vestigial chitin-protein complex was found at concentrations slightly more than half the value in modern scorpions. Production of fatty acids in the breakdown of the exoskeleton may protect the degraded chitin protein complex from further decomposition.

**Comment.** It appears that the exoskeleton of scorpions was much the same as that of modern scorpions. The detection of organic residues of chitin is another example of biomolecular preservation that seems anomalous under the theory of long ages, but is not so surprising under the theory of a recent creation.



*Black Scorpion (Androctonus crassicauda). Photo by Per-Anders Olsson (used with permission).*