

## GEOSCIENCE NEWSLETTER

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### RESEARCH GRANTS

The Geoscience Research Institute awarded three grants for research at its annual Board meeting in February.

Dr. Arthur Chadwick of Southwestern Adventist University will study geographic patterns of paleocurrents in Russia and China. Dr. Chadwick has been studying paleocurrents for several years, and is compiling a database to better understand earth history.

Dr. William Hayes of Loma Linda University will study two endemic reptile species of the Caribbean, a snake and a lizard. This research will add to our understanding of how species adapt to local environments, and how best to manage and preserve these interesting species.

Dr. Kevin Nick of Loma Linda University will study the stratigraphy of the Miocene Pisco Formation in Peru. This study will improve our understanding of this area famous for its abundance of fossil whales and other marine species.



*Raúl Esperante and Orlando Poma study fossil whales in Peru.*

### RESEARCH IN PERU

Research is an important facet of the work of the GRI scientists. Several have been very active in several projects

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related to earth sciences, especially in studying the processes of sedimentation and fossilization. One such project is in Pisco Formation in the coastal desert of southern Peru, a sequence of sedimentary layers that contain abundant fossils, and where Dr. Raúl Esperante has been digging fossil whales and other marine creatures for over a decade.

Early this year Dr. Esperante spent several weeks with students from California, Texas and Peru examining different outcrops with fascinating fossil content. They discovered an area that contains abundant fragments of petrified wood and logs, along with fossil shells and marine mammal skeletons in several layers. This area will be the subject of several research projects for graduate students. They also discovered several layers that show evidence of tsunamis and storms in the past.

Dr. Esperante and his colleagues have published several scientific articles about the Pisco Formation and the fossils therein. More research and publications are planned as he, his students, and field assistants continue to work in this fascinating area.

### SAN ANDREAS FAULT FIELD TRIP

Over 160 teachers participated in a recent field trip organized by GRI to the San Andreas Fault. Arguably the world's most famous geologic fault, it divides the San Bernardino Mountains, not far from the GRI office in Loma Linda, California. The teachers were able to collect interesting minerals, see how the fault has impacted the region's geology, and appreciate the forces at work in our dynamic earth.

These teachers were participants in a conference introducing new science textbooks produced for grades 1-8 by



*Teachers view a sag pond created by movement of the San Andreas Fault.*

the North American Division Education Department. GRI has offered support for this major project by participating in the lead team creating the texts, reviewing materials and in other ways, such as this field trip. Excellent education about the creation is a central mission of GRI.

Teachers interested in understanding geology, biology and Seventh-day Adventist belief in the Biblical creation may be interested in participating in the next GRI field school which will be held during 2014 in Calgary, Canada. Further information will be on our [website](#).

### New Grant Program

The General Conference Faith and Science Council has initiated a science research grant program to encourage original research and publication that contributes to our understanding of origins in a biblical framework. One goal of this program is to encourage scientists at different SDA educational institutions, even in different parts of the world, to collaborate in these research efforts. A description of the grant program and application deadlines and a copy of the application form can be requested from Leonard Brand at [lbrand@llu.edu](mailto:lbrand@llu.edu). Feel free to e-mail him with any questions you have about this program.

## SCIENCE NEWS

### Protists or Metazoans?

Huldtgren T, Cunningham JA, Yin C, Stampanoni M, Marone F, Donoghue PCJ, Bengtson S. 2011. Fossilized nuclei and germination structures identify Ediacaran 'animal embryos' as encysting protists, *Science* 334 (23 December):1697-1699.



Artist's depiction of soft-bodied Ediacaran. Credit: Smithsonian Institution, <http://ocean.si.edu/slideshow/ocean-throughout-geologic-time-image-gallery>.

**Summary.** Tiny spherical fossils found in the Doushantuo Formation of China have been interpreted as embryos of sponges or cnidarians. Using x-ray tomographic microscopy, the authors of this study determined that the pattern of cell division seen in these fossils differs from that in metazoans, and resembles that seen in some Mesomycetozoa. The authors conclude the fossils are neither embryos nor metazoans, but instead are cyst-like mother cells produced by some kind of protist.

Schiffbauer JD, Xiao S, Sharma KS, Wang G. 2012. The origin of intracellular structures in Ediacaran metazoan embryos, *Geology* 40:223-226, doi:10.1130/G32546.1

**Summary.** The identity of the Ediacaran embryo-like fossils has been controversial. This study used micro-computed X-ray tomography and environmental scanning electron microscopy to study the texture of the fossils. The membranes and nucleus-like structures are interpreted as due to mineralization processes, which make it impossible to classify the fossils on

the basis of their membranes. Instead, classification should rely on more stable features such as cleavage patterns, cell-cell adhesion, and ornamented envelopes. These features favor the interpretation that the Doushantuo fossils are metazoan embryos.

Clites EC, Droser ML, Gehling JG. 2012. The advent of hard-part structural support among the Ediacara biota: Ediacaran harbinger of a Cambrian mode of body construction, *Geology* 40:307-310; doi:10.1130/G32828.1

**Summary.** A fossil from the Ediacaran Rawnsley Quartzite has features found also in a Cambrian fossil sponge, *Choia*. The Ediacaran fossil, named *Coronacollina acula*, is a small, cone-shaped organism with long, sponge-like spicules. The spicules are the oldest known hard structures, possibly made of silica. This fossil shows the presence of sponge-like fossils in Ediacaran sediments, and suggests a link with Cambrian fossils.

**Comment.** The identity of these fossils has implications for the "Cambrian Explosion," a term for the abrupt appearance of numerous types of marine invertebrates in the lower Cambrian layers. Identification of these fossil structures as sponges would mean the "Cambrian Explosion" was less abrupt, and would imply that many fossil lineages existed in the Precambrian, but were not preserved in the fossil record. Identification of the fossils as protistan cysts would remove this claim and leave intact the proposal that the "Cambrian Explosion" occurs within a relatively narrow stratigraphic range.



Unidentified Ediacaran fossil impressions in sandstone. Interpretation of the Ediacaran fossils has been controversial.

The difficulties in interpreting these fossils and the different claims being made are instructive. Caution is needed when evaluating conclusions based on ambiguous data, especially when the claims concern historical and philosophical questions.

### Pigeon Math

Scarf D, Hayne H, Colombo M. 2011. Pigeons on par with primates in numerical competence, *Science* 334 (23 December):1664.

**Summary.** Primates have been thought to have advanced capabilities in numerical ordering. Monkeys can learn to order certain stimuli, and then apply the learning to new stimuli. This



The common pigeon, *Columba livea*, in Japan. Photo by Alpsdake, used by permission, commons.wikipedia.org.

study compared the ability of pigeons to that of monkeys, and found similar numerical ordering skills. Pigeons trained to order lists of three items were presented with different combinations of items, and were able to apply the rule they had learned to new combinations of stimuli. Birds may be on a par with primates in these skills and have greater mental abilities than we have thought.

**Comment.** The ability of pigeons to count and reason in simple ways is not evidence for common ancestry of pigeons and humans. Neither should such abilities be considered evidence for common ancestry of monkeys and humans. It is perhaps better explained as the result of common design by an intelligent creator, who may have given His creation more intelligence than we realize.