

## INSIDE THIS ISSUE



5



14



49

### FEATURES

2012 AIPG Annual Meeting Registration Form	7
2012 AIPG Annual Meeting Program	9
2012 Scholarship Winner Essays	10
Georgia Section Conference Registration Form/Information	15/20
Geology and Stephen King <i>Bob Blauvelt, CPG-06508</i>	16
2012 AIPG Annual Meeting Exhibitor Form	21
Accelerating Sea Level Rise Along U.S. Atlantic Coast “Hotspot” <i>AGI Geospectrum</i>	31
2012 AIPG Annual Meeting Sponsorship	35
The History of the Fort Worth Basin <i>Billy R. Caldwell, CPG-07464</i>	42
Colorado Geological Survey Study Wins National Award	45
AGI News	46
AIPG/AGWT-Shale-Gas Development and Water Issues Symposium in Austin, Texas <i>Scott Daniel, CPG-05044</i>	47
Fossil Site in Golden, Colorado Dedicated.	50
AGI Geoscience Currents	51
Super-Volcanoes! How Much Warning Do We Get Before a Gigantic Eruption? <i>David J. Tenenbaum</i>	52
The Oldest and Largest Meteorite Crater Ever Found On Earth <i>Sigma XI SmartBrief</i>	53

**Spearfish Canyon—North of Rapid City near the town of Spearfish lays Spearfish Canyon Scenic Byway—a stunning 19-mile cruise through towering limestone walls and dense deciduous forest. The road follows Spearfish Creek past historic Homestake Gold Mine hydroelectric plants and multiple waterfalls. Photo compliments of the South Dakota Convention and Visitors Bureau.**

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## DEPARTMENTS

- 3 Section News
- 22 Test Your Knowledge
- 23 President's Message
- 25 Executive Director's Column
- 26 Test Your Knowledge Answers
- 27 Student Chapters
- 27 Letter to the President
- 28 Professional Ethics and Practices
- 32 Hydrothink
- 33 Student's Voice
- 34 Educator's Page
- 36 Professional Services Directory
- 39 New Applicants and Members
- 41 Online Courses
- 48 Members in the News
- 54 AIPG Store

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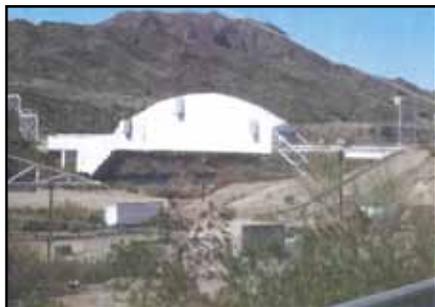
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## ARIZONA SECTION

Where was this photograph taken and what is happening there?



This is the famous Arch Bridge that crosses the Colorado River just south of Interstate 40 between Topock, Arizona and Needles, California. The Arch Bridge is a narrow span that originally carried vehicle traffic across the river into California from 1916 to 1947. It was part of Route 66 from 1926 to 1947, and is seen in the 1940 movie *"The Grapes of Wrath"*. During World War II vehicle size increased, essentially turning the bridge into a one lane road: the large trucks could only cross one at a time. After a new, wider bridge was constructed just upriver in 1947, the Arch Bridge was closed to traffic. It then was purchased by Pacific Gas & Electric Company, who now shares use with El Paso Natural Gas Company. The bridge supports two natural gas transmission pipelines: one 34-inch and one 30-inch diameter.

Why the white cover? The bridge has been under renovation since January 2012. The old lead-based paint is being blasted off, and the white plastic covering contains the spent abrasive blast media and lead contaminants under negative pressure. The blast media is collected via an industrial vacuum and cyclone system under the east side of the bridge, placed in supersacks, tested for lead content, then shipped for disposal at an approved landfill. The bridge is being repainted in stages, and the work should be completed in July at a cost of about \$1.4 million.

**Dave Palmer, CPG-09960**  
Section Secretary



## California Section

For the twelfth year, AIPG California Section provided judges for an earth science speciality prize at the California State Science Fair at the California Science Center in Exposition Park in Los Angeles, California on May 1, 2012. The AIPG California Section sponsored the prizes. In addition to the awards presented by the California Section judges on behalf of the California Council of Geoscience Organizations, other awards were given by the sponsors of the fair.

Long-time judge, David Sadoff, an eleven year AIPG judge and Jim Jacobs, a four year judge, reviewed the seventeen junior division (6<sup>th</sup> through 8<sup>th</sup> grade) and seven senior division (9<sup>th</sup> to 12<sup>th</sup> grade) projects. All projects had been through local and regional science fairs in order to proceed to the California State Science Fair in Los Angeles. Each student was required to provide an abstract, including objectives/goals, methods/materials, results and conclusion/discussion. All entrants prepared a detailed poster and display with the science research. In addition, students were required to note the help they received from others. Some students had entered for the first time, while others had research that was on going. One tenth grader had been to the state science fair five times (6<sup>th</sup> grade to 10<sup>th</sup> grade) with updates and progress reports to the original research. The judging included student presentations in front of their project posters and interviews with the judges. The students interviewed at the State Science Fair were articulate regarding their research.

The winners from the Senior Division was Rose L. Leopold and the Junior Division was Matthew J. Chaffee. The two winners received a signed AIPG California Section Certificate as well as a \$250 check. Below are the winning abstracts.



Senior Division winner, Rose L. Leopold (middle) with judges Jim Jacobs, CPG-07760 (left) and Dave Sadoff, CPG-09933 (right).

**Senior Division Winner:** Rose L. Leopold; Project Title: Morphological Disparity during the Ammonoid Recovery after the Permian Mass Extinction

**Objectives/Goals**

The Permian mass extinction caused the elimination of 80% of marine genera. Ammonoids, however, survived the extinction and returned to the levels of diversity that had been seen in the Late Permian within a million years while other groups recovered at a much slower rate.

This project examines how morphological disparity in ammonoid fossils decouples from taxonomic diversity following the Permian mass extinction. I hypothesized that the two diversities would follow the same trends before the extinction, but then break away from each other before once again leveling out.

**Methods/Materials**

I measured whorl expansion, umbilical diameter, aperture height, aperture shape and ventral acuity from illustrated specimens of 135 genera and used principal components analysis to quantify morphological diversity.

**Results**

Ammonoid disparity decreased after the extinction, but did not reach its lowest until the Dienerian sub-stage (2 sub-stages after the extinction), unlike taxonomic diversity which was lowest immediately after the extinction. By the Smithian sub-stage (4 sub-stages after the extinction) ammonoids had recovered in both morphological disparity and taxonomic diversity.

**Conclusions/Discussion**

Morphological disparity of ammonoids decreased after the extinction, but did not reach its lowest point until the next sub-stage. After reaching its lowest level of diversity on the Dienerian, ammonoids recovered at an astounding rate and regained the levels of diversity that were seen before the extinction and then even more. Taxonomically, ammonoids reached their lowest levels of diversity directly after the extinction, but then recovered around the same time as morphological disparity. This was most likely due to their ecology which allowed them to avoid the deepest waters where oxygen levels were low and due to their high metabolic rate which enabled them to better adapt to ocean acidification. The response of these ammonoids can help us to understand traits like motility that allowed ammonoids to come back