

## ALAN E. LEVITON STUDENT RESEARCH AWARD REPORT



### *Origin of Glass Shards from Pinnacle Point, South Africa*

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Ms. Ciravolo is one of two recipients of the 2013 AAAS, Pacific Division  
Alan E. Leviton Student Research Award. Dr. Eugene Smith is her advisor.  
Microscopic photos provided by Ms. Ciravolo.

Funding received from AAASPD was used for supplies to help stock the cryptotephra extraction lab at UNLV for use in the project of locating volcanic glass shards from archaeological deposits at Pinnacle Point cave 5-6 in Western Cape, South Africa. \$525 was used to obtain 1 liter of Lithium Metatungstate for use in heavy liquid separation. The remaining \$75 went towards buying consumable supplies for the lab, including centrifuge tubes, and HCl for use in the separation process.

At the time of the award and the AAASPD conference in Las Vegas, preliminary work on the project revealed several small rhyolitic glass shards with chemistry similar to the Youngest Toba Tuff (YTT) from within sedimentary deposits around 70-75 ka. If the rhyolitic material formed a layer within the sediment (a cryptotephra or “invisible” layer), it could be used as a relative dating tool to corroborate the OSL (Optically Stimulated Luminescence) ages for the site and, if from Toba, would be the most distal deposit of the YTT found to date. Work so far on the project has included using acid and heavy liquid separation to better isolate rhyolitic glass shards from samples from PP5-6, microprobe analyses on the rhyolitic glass shards, opal-like grains, and phytoliths, further sampling of the site (PP5-6), and Raman and Infrared spectroscopy of the opal-like grains.

Further work has shown that the quantity of volcanic glass shards within the sedimentary deposits is extremely low at PP5-6, below the usual limit for considering it a cryptotephra layer. However, some recent publications discussing cryptotephra in sand dunes and archaeological deposits have used quantities similar to what is found in PP5-6. Besides rhyolitic glass shards, another interesting material was discovered in the sediment. This opal-like material has an appearance similar to the rhyolitic glass but

microprobe analyses show that it is mostly silica with a few percent of aluminum and sodium. Due to the discovery of this material, the project has taken several interesting turns. Preliminary rhyolitic glass counts included opal-like material since the two cannot be definitively distinguished from each other without doing chemical analyses. Because of this, the shard frequency profiles used to determine where a cryptotephra layer might be located showed a broad distribution that is usually interpreted as mixing or some sort of disturbance of the sedimentary deposits. Discovering the opal-like grains and removing them from the profiles has revealed a distinct peak where rhyolitic glass shards have been found. Future work includes isolating more rhyolitic shards from this area for analysis to better determine if they are from Toba and collecting samples from other sites to see if the shards are present elsewhere and if they can be found in greater quantity. 📷

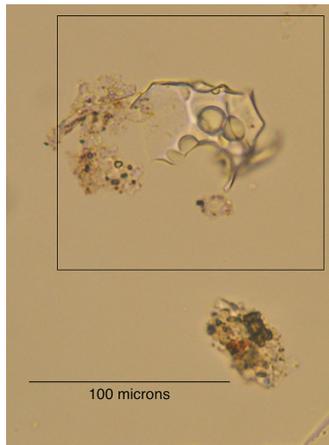
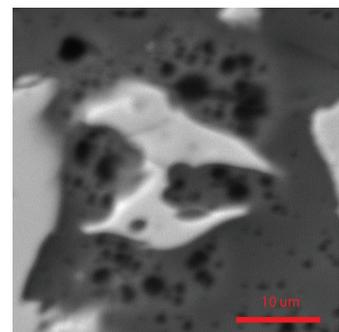


Image of an analyzed opal grain under plain light.



BSE image of one of the analyzed rhyolitic glass shards.