

# Public Outreach and Education with Meteorites Involving a Museum Exhibit, Website, and Teacher Workshops

M.L. Hutson, R.N. Pugh, A.M. Ruzicka, Cascadia Meteorite Laboratory, Portland State University, Dept. of Geology, 17 Cramer Hall, 1721 SW Broadway, Portland OR 97207

The main lesson learned from this E/PO effort was to be flexible and use a variety of educational venues

## Teacher Workshops and Public Outreach:

- As part of Portland Public Schools summer workshop program
- At professional meetings (Oregon Science Teachers Association and Oregon Academy of Science)
- Through Intel Science Fair (regional and national)
- In schools and classrooms

## Lessons learned:

- 1) K-12 teachers already have a variety of workshops and educational events they are expected to attend.
- 2) Accommodate teacher needs and schedules by going to them at already scheduled events or to their classrooms.

## Lectures and hands-on demonstration to classrooms and groups at public libraries in rural Oregon in partnership with Libraries of Eastern Oregon (LEO) and the Oregon Museum of Science and Industry (OMSI)

**WANTED**  
OR INFORMATION LEADING TO THE DISCOVERY OF NEW METEORITES

**METEORITES ARE:**  
HEAVIER than most rocks found at Earth's surface  
MAGNETIC – either slightly or a lot  
FUSION COATED with a thin brown or black coating and shallow pits resembling thumb prints  
IRREGULAR IN SHAPE – irregular and sometimes aerodynamic shapes  
Weathered meteorites may appear very rusty

LEARN MORE!  
FREE PROGRAM – Open to all ages!

**Baker Co. Public Library**  
Wed., Oct. 5 7 PM  
Richard Pugh, Cascadia Meteorite Laboratory  
& \$20,000 of meteorites to touch and handle!

**METEORITES**

If you have information about a possible meteorite, contact: Cascadia Meteorite Laboratory, Portland State University, (503) 287-6733 [mhutson@psu.edu](mailto:mhutson@psu.edu)

**The hunt for new meteorites**

Fifth graders were able to handle \$20,000 in December during a presentation by meteorite scientist Dick Pugh, who said, "These are the oldest rocks we have, they're 4.5 billion years old." Pugh said, adding meteorites come from an asteroid belt between Mars and Jupiter and fall to the earth at a speed of 50,000 mph. (They are called meteorites until they hit the ground, then they are called meteorites.)

In Oregon, only four meteorites have been found, and all of those were on the west side of the Cascades. Pugh is always trying to locate new meteorites and examined two including a 10-pound one meteorite found in Astoria valued at \$15,000, a 15-pound one piece found in Africa valued at \$5,000, and several small "bobby" meteorites. Pugh said that meteorites are heavy, magnetic, and have a smooth coating with thumbprint-like indentations. Pugh himself has found four meteorites.

Public outreach activities for 2004 and 2005

- 12-15-05 lecture at library and assembly at school in Multnomah, OR as part of a 2 day tour
- 12-15-05 lecture at library and assembly at school in Wero, OR as part of a 2 day tour
- 12-15-05 lecture at Oregon Archdiocese of Astoria, Portland, OR
- 12-15-05 lecture at Columbia College Museum, The Dalles, OR
- 11-07-05 two lectures at Gregory Heights Middle School, Portland OR
- 10-28-05 lecture at Fossil High School, Fossil OR
- 10-07-05 lecture at library and assembly at school in Prineville OR as part of a 2 day tour
- 10-06-05 lecture at library and assembly at school in Ilwaco OR
- 10-05-05 lecture at library and assemblies of two middle schools in Baker, OR
- 10-05-05 lecture at library and lectures at LaGrande Middle School in LaGrande OR
- 10-03-05 lecture at library in Boardman OR
- 10-02-05 lecture at library and assemblies of two middle schools in Baker, OR
- 10-01-05 lecture at Geom as in Hillsboro OR
- 09-30-05 lecture to Ice Age Institute, Portland OR
- 09-03-05 lecture demonstration at Oregon Star Party, Ocochee Mountains OR
- 08-12-05 lecture at Mt. Hood Community College, Gresham OR
- 07-08-05 lecture at Piko Teachers Workshop, Fossil OR
- 07-02-05 lecture to Milwaukee Gold Prospector, Milwaukee WI
- 04-16-05 lecture for Astronomy Day in Eugene OR
- 04-06-05 two lectures in Geology Department of Oregon State University, Corvallis OR
- 04-01-05 exhibit at Intel Northwest Science Expo
- 03-26-05 lecture to the Lightfoot Society in Portland OR
- 02-26-05 display at Oregon Academy of Science (OAS) at Oregon State University, Corvallis OR
- 02-24-05 lecture at Rose High School, Rose OR
- 02-22-05 lecture to USGS, Oregon City OR
- 01-24-05 lecture to two classes at Gregory Heights Middle School, Portland OR
- 12-04-05 lecture to the Cambrian Society, Portland OR
- 11-21-05 lecture to the Geological Society of the Oregon Country (GSOOC) at Portland State University, Portland OR
- 11-03-05 lecture to Columbia Williamson chapter of Sigma Xi at Portland State University, Portland OR
- 10-08-05 workshop at Oregon Science Teachers Association (OSTA) in Salem OR
- 07-06-04 lecture at Mt. Hood Community College, Gresham OR
- 06-30-04 lecture to the Oregon City Rotary Club, Oregon City OR
- 06-16-04 teacher workshop for Portland Public Schools
- 05-19-04 lecture to several classes at Grant High School, Portland OR
- 05-17-04 lecture to two classes at Cleveland High School, Portland OR
- 05-13-04 to 05-14-04 exhibit at Intel International Science and Engineering Fair (ISEF) at the Portland Convention Center
- 05-04-04 lecture at Oregon Museum of Science and Industry (OMSI), Portland OR
- 04-09-04 lecture to Sherwood Rotary Club, Sherwood OR
- 04-04-04 lecture to class at Cascade High School, Marion County OR
- 03-09-04 lecture to senior citizens at Clatsop Community College Workforce Training Center, Clatsop OR
- 02-28-04 display at Oregon Academy of Science (OAS) at Portland State University, Portland OR

## Website (<http://meteorites.pdx.edu>):

- Site has global reach judging from e-mail contacts
- Combination of static web pages and interactive meteorite identification exercise
- Lessons learned: Allocate more time and energy if third party (software designer) involved; educating third party required

Cascadia Meteorite Laboratory  
Portland State University

- About Us
- Meteorite Research
- Space and Planetary Minor
- Public Outreach Program
- About Meteorites
- Think you've got a meteorite?
- Erwin F. Lange Endowment
- Fireballs
- Interactive meteorite ID exercise

Mailing Address: Department of Geology, Portland State University, P.O. Box 753, Portland, OR 97207-0753  
Telephone: (503) 725-2372, Fax: (503) 725-3612, e-mail: [mhutson@psu.edu](mailto:mhutson@psu.edu)

Physical Street Address: Department of Geology, Portland State University, Room 17 Cramer Hall, 1721 SW Broadway, Portland, OR 97207

Link to Geology | Link to PSU

Last Updated: December 1, 2005

Sample Unknown #5

Instructions: Click on the green arrows to rotate the sample. Click on the green boxes to select another sample. Click on the red box to select a sample. Click on the red box to select a sample.

Tests: Magnetism, Fusion, Appearance

Requirements: The sample is roughly spherical. The sample is roughly spherical. The sample is roughly spherical.

Appearance: Both the surface and interior have rounded pebbles and are unconsolidated or poorly consolidated.

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## Museum Exhibit (Rice NW Museum):

- Informational panels and meteorite specimens
- Approximately 6000 K-12 students per year, 40% from outside Portland metropolitan area
- Examples of 2 panels below (blue type indicates space where a meteorite specimen is attached to the display)

Where do meteorites come from?

**Our Solar System**

Our solar system consists of the planets, moons, asteroids, and comets orbiting the sun. The bulk of the solar system is made up of gas and dust. Most planets have a rocky or metallic core and a gaseous atmosphere. Comets and asteroids are made of rock and metal. Asteroids are found in the asteroid belt between Mars and Jupiter. Comets are found in the Oort cloud, a spherical shell of icy objects that surrounds the sun.

**Reflectance spectra show that some meteorites are pieces of main belt asteroids**

Astronomers observe the light reflected from asteroids and compare it to the light reflected from meteorites. This comparison shows that some meteorites are pieces of main belt asteroids.

**Headlike surface texture: a mixture of smooth and jagged fragments**

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**Bubble-like surface texture: fragments that have melted at or near the surface**

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**Stippled rock that disintegrates from melt in the deep interior crust**

Stippled rock that disintegrates from melt in the deep interior crust.

**NWA 2066, Sahara Africa (powdery)**

**Dhoor 007, Oman (pearly)**

**Belings, Burkina Faso (diagonal)**

Where do meteorites come from?

**We know that some meteorites come from the Moon**

As of mid-2004, 18 separate lunar meteorites, most found in Africa and Antarctica, have been recognized. Chemical and isotopic analyses demonstrate that these meteorites are either identical to lunar rocks returned by Apollo astronauts, but they contain a larger area of the lunar surface.

**Lunar meteorite Dhoor 007, Oman**

**We know that some meteorites come from Mars**

As of mid-2004, 18 separate Mars meteorites, most found in Africa and Antarctica, have been recognized. These contain trapped gases and isotopes measured from the Martian atmosphere, along with distinctive ages, and resemble the crystals and the presence of water. All these characteristics indicate that these meteorites come from Mars.

**Martian meteorite (shagreened) SAU126, Oman**

**Shaw 001, Oman (shagreened)**

**Shaw 002, Oman (shagreened)**

**Shaw 003, Oman (shagreened)**

**Shaw 004, Oman (shagreened)**

**Shaw 005, Oman (shagreened)**

**Shaw 006, Oman (shagreened)**

**Shaw 007, Oman (shagreened)**

**Shaw 008, Oman (shagreened)**

**Shaw 009, Oman (shagreened)**

**Shaw 010, Oman (shagreened)**

**Shaw 011, Oman (shagreened)**

**Shaw 012, Oman (shagreened)**

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**Shaw 014, Oman (shagreened)**

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**Shaw 099, Oman (shagreened)**

**Shaw 100, Oman (shagreened)**