THE GEOLOGICAL NEWSLETTER

"NEWS OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY"

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MARCH/APRIL 2011

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VISITORS WELCOME AT ALL MEETINGS

CALENDAR

MARCH/APRIL ACTIVITIES

The Seventy-sixth GSOC Annual Banquet will be held on Sunday, March 13, 2011, at the Monarch Hotel in Clackamas, Oregon. Speaker Jay Van Tassel of Eastern Oregon University will present "Bulldozer Paleontology: New Ice Age Fossils from the Grande Ronde Valley, NE Oregon." The registration flyer for the event can be found in the February edition of the *The Geological Calendar* or on the website (www.gsoc.org). Deadline for receipt of registration forms is Monday, March 7, 2011.

There will be no Friday night meeting in March due to the Annual Banquet.

Friday evening talk, April 8, 2011, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Courtney Cloyd, retired, former Senior Geologist for Geologic Hazards and Geologic Resources, US Forest Service, will present "The Paleontological Resources Preservation 'Act' and Amateur Fossil Collecting".

The talk will include an overview of how the Paleontological Resources Preservation subtitle (in the 2009 Omnibus Public Land Management Act) will guide management of fossils on Federal lands, and what it means for amateur paleontologists and collectors. Cloyd is a native Oregonian and graduate of the University of Oregon. He's a registered professional geologist in Oregon and Washington, and recently retired after thirty-five years as a geologist with the US Forest Service.

Join GSOC members at **Pizzicato Pizza, 1708 SW 6th Ave.**, at **6:00 p.m.** before the lecture for an informal dinner and conversation.

Free parking is available at Portland State University **Friday** nights after 5 p.m. and **Wednesday** nights after 7 p.m. in Parking Structure 2 on Broadway Ave. directly across from Cramer Hall and on level one of Parking Structure 1, bounded by Broadway and 6th Aves. and Harrison and Hall Sts.

Future Activities

Friday evening talk, May 13, 2011, at 7:30 p.m., in Room S17, Cramer Hall, 1721 SW Broadway Ave. (between Montgomery and Mill Sts.), Portland State University. Speaker Charlie Hammond, Senior Associate at Cornforth Consultants, Inc., with 23 years of engineering geology experience, will present "Giant Paleo-Landslides of the Tyee Formation near Eddyville, Oregon Coast Range: Complex Geologic History from LIDAR and Radiocarbon".

Giant paleo-landslides have been uncovered at the US Highway 20 construction project between Corvallis and Newport, Oregon, in the turbidite beds of the Tyee Formation. Geotechnical models for landslide evaluations have been developed based on the LIDAR, subsurface explorations, construction outcrops, and radiocarbon testing. The process of predicting the landslide boundaries (head scarps, toes, lateral and basal shear zones) for the stability analysis models has revealed details of their geologic history. The oldest slides are not readily visible; that is, most of their geomorphology has been removed or masked by surficial processes. They appear to have been giant translational-block slides that are controlled by bedding, high-angle fault zones and paleo-topography. Erosion has divided some of the giants into multiple landslides, and the landforms also reflect multiple episodes of sliding.

Field Trip to Columbia Basin and Eastern Washington

May 20-22, 2011- GSOC member and Field Trip Chair Dave Olcott is arranging a three day trip based in **Kennewick, Washington** to study Columbia River Basalts, Ice Age Flood features, and their impact on this area. Day 1 of the trip will include a car caravan featuring stops along the Columbia River and in the Walla Walla Valley. Kevin Lindsey, Senior Hydrogeologist at GSI Water Solutions, Inc., with the assistance from members of the Walla Walla Watershed Alliance, will address surface and groundwater issues in the above valley. *Note that Lindsey will also give a lecture in the USGS Winter Seminar Series in Portland on March 8 – see page 13.* Days 2 and 3 will be van-based tours guided by Terry Tolan and Steve Reidel, both Senior Hydrogeologists at GSI Water Solutions, Inc., and experts on Columbia River Basalt.

Anticipated fee for the trip will be $65 and will include the trip packet, van transportation on days 2 and 3 only, and speaker honoraria. All other expenses and arrangements will be the responsibility of the participants. There will be both camping and hotel options in the area for the participants, and early reservations for campsites is advised. Since the van spots will be limited, interested parties are also advised to get on the participant list soon. A registration form for the trip will be available in the April edition of *The GSOC Calendar* and on the website. If you have questions or wish to reserve a participant spot at this time email Dave at daveolcott46@yahoo.com or call (503) 695 - 5219.

NOTE: You must be a GSOC member or guest of a member to attend GSOC field trips. You may join GSOC at any time, for $25.

Check the GSOC website (www.gsoc.org) for updates to the calendar, including information on the upcoming meetings and the GSOC 76th Annual Banquet in March.

UPCOMING ACTIVITIES FROM OTHER ORGANIZATIONS

Portland State University Geology Department Geology Winter Colloquium 2011, Cramer Hall S17, 3:30-4:30 p.m.. All are invited to attend! For information contact: Scott Burns, 503/725-3389, burnss@pdx.edu, or refer to the department website: http://geology.pdx.edu/

This Winter Term PSU is only offering seminars for the School for the Environment and for Geospatial Technology. Please refer to the geology department website for links to these seminars.

As of this publication, the lecture schedules have not been announced for the Spring seminars. Do check the department website near the beginning of April for the upcoming lectures. Do check the times and locations also as they may have changed.

Oregon State University Department of Geosciences 2011 Winter Seminar Series, Thursdays, 4:00 pm, Gilfillan Auditorium, unless otherwise noted. Refer to department website for more information: http://www.geo.oregonstate.edu/node/524

Seminar topic for Winter 2011 is "Blast from the Past!"

- March 3 – Sharon Kelly, HDR Engineering, "Adventures in Transportation Planning in Portland"

As of this publication, the lecture schedules have not been announced for the Spring seminars. Do check the department website near the beginning of April for the upcoming lectures. Do check the times and locations also as they may have changed.

University of Oregon Department of Geological Sciences, Winter 2011 Weekly Seminar Series, Wednesdays, 4:00 to 5:20 pm in 110 Willamette Hall. Tea and cookies are served in Cascade 200 beginning at 3:30 p.m.. Refer to department website for more information:
http://www.uoregon.edu/~dogsci/news/about

- March 2 - Chris Bell (University of Texas), "Assumption of a strict modern analog clouds our understanding of the paleoecology of the Pleistocene"
- March 9 - John Platt (University of Southern California), "Alboran domain collapse and the Ronda peridotite"

As of this publication, the lecture schedules have not been announced for the Spring seminars. Do check the department website near the beginning of April for the upcoming lectures. Do check the times and locations also as they may have changed.

USGS Winter 2011 Seminar Series Schedule - Oregon Water Science Center
Brown Bag Seminars (http://or.water.usgs.gov/brownbag/) are held on Tuesdays from noon to 1 pm. unless noted otherwise. The seminars are informal and are open to the public. Bring your lunch. The USGS Oregon Water Science Center office is located in Portland at 2130 SW 5th Ave. Directions to the USGS office are posted at http://or.water.usgs.gov/location.html.

- Friday, March 4, Noon to 1 pm, "The Pursuit of Uncertainty in Hydrologic Climate Change Impact Assessment: Improved Characterization, Quantification and Communication", Hamid Moradkhani, Assistant Professor, Department of Civil & Environmental Engineering, Portland State University
- March 8, "Geologic, Hydrogeochemical, and Water-Level Evidence for Hydrologic Compartmentalization in the Columbia River Basalt Aquifer System in the Columbia Basin GWMA", Kevin Lindsey, Senior Hydrogeologist, GSI Water Solutions, Inc., Kennewick, Washington
- March 15, "Preferential Flow and Contaminant Transport to Public Water Supply Wells: Lessons from NAWQA TANC", Rick Johnson, Professor, Oregon Health & Science University, Beaverton, OR

OMSI Science Pub Portland
There are now TWO Science Pubs in Portland -- one at the Bagdad Theater in Southeast, and one at Mission Theater in Northwest. Learn about cutting-edge topics in science and technology from leading researchers and scientists, all while enjoying food and drinks. Experience an informal atmosphere where you can interact with experts and where there are no silly questions. No scientific background is required; just bring your curiosity, sense of humor, and appetite for food, drinks, and knowledge!

- Monday, March 7, 2011 - 7:00pm, "Expedition Titanic 2010: Return to the Deep", Portland - Bagdad Theater, P.H. Nargeolet, director of Underwater Research for RMS Titanic, Inc., is widely acknowledged as the leading authority on the Titanic wreck site.
- Tuesday, March 15, 2011 - 7:00pm, "Friends or Foes? Facing the Facts about American Crows", Portland - Mission Theater, Dr. David P. Craig, associate professor and chair of the Department of Biology at Willamette University.
- Monday, April 4, 2011 - 7:00pm, "Why Everyone (Else) Is a Hypocrite", Portland - Bagdad Theater, Robert Kurzban, PhD, author of the book Why Everyone (Else) Is a Hypocrite, and associate professor in the Psychology Department at the University of Pennsylvania. He founded PLEEP, the Penn Laboratory for Experimental Evolutionary Psychology, in 2003.

Check the OMSI Science Pub website for updates to the lectures. http://www.omsi.edu/sciencepubportland

GSOC Dues are Past Due

If you haven't sent in your GSOC dues please do so right away! Dues were due on January 1, 2011. If you joined the society after September 1, you don't have to renew your membership dues until next year. See page 18 for membership dues schedule.

GSOC members wishing to obtain a membership list call or email Secretary Beverly Vogt, and she will mail you one.

New Slate of Officers

The following slate of officers has been approved by the society at its annual February meeting:

President .....Rik Smoody
Vice President..... Jane Walpole
Secretary ..... Paul Edison-Lahm
Treasurer ..... Richard Bartels
Director, 3 years .....Julia Lanning
Director, 2 years .....Dawn Juliano
Director, 1 year.....Anne O'Neill

Welcome new officers!

BOARD MEETING NOTES

February 19, 2011

The meeting was called to order by President Larry Purchase at the home of Wenonah and Larry Purchase. Board and GSOC members present included Larry Purchase, Rik Smoody, Beverly Vogt, Richard 'Bart' Bartels, Dave Olcott, Janet Rasmussen, Carol Hasenberg, Tara Schoffstall, Rosemary Kenney, Doug Rasmussen, Dawn Juliano, Jane Walpole, Julia Lanning, Antonella Mancini, and Wenonah Purchase. The minutes of the December 11, 2010, meeting were approved.

Treasurer's report was given by Bart and was approved.

Report on **future Friday night lectures** was given by Jane Walpole. Charlie Hammond will speak in May, and Jane is hoping to get Courtney Cloyd from the Forest Service to speak in April on fossil collecting regulations on Federal lands. Janet reported on the Fossil Fest at Newport. It was very successful, with approx. 12 GSOC members attending.

Plans for the March Annual Banquet were discussed. Thirty people have already sent in their money. Janet will prepare a draft of the program and circulate it among Board members for corrections and suggestions. Bart will send Janet all the new names he receives. Extra ammonites can be used for table decorations or something else if suggested. Rosemary will bring the collection of old place cards as a display, and Bev and Bart will make arrangements to pick them up from the GSOC storeroom at PSU for Rosemary. Jan Kem will handle the sales table of books, field trip guides, maps, etc, and donations are requested (no rocks please). Larry will prepare a display of posters for the Friday night talks.

Tara and Antonella will research a new local place to **order mugs and T-shirts**, and Janet and Carol will act as consultants on design and plans for the new order. They are requested to report their findings and suggestions at the next meeting.

Dave presented his plans, estimated costs, lodging possibilities, and insurance issues for his May 20-22 **field trip to eastern Washington to look at classic Columbia River Basalt and Missoula Flood** localities, including rental of two vans for days 2 and 3. Information for the registration form has to be in to Carol by March 20 for the newsletter, with itinerary details to her ASAP. Dave estimated costs at $60/person, but after going over the figures suggested cost be raised to $65/person. Registration form should include cell phone numbers for all field trips, and leaders should prepare a list of participants' cell phone numbers for all participants. Janet is working on her June 17-19 field trip to the coast, and she is requested to have her details for the registration form to Carol by April 20, with other information to Carol ASAP. Rik will have his President's Trip in August and is asked to get his information to Carol by June 20. Paul Edison-Lahm's Portland building stone trip could be held in the fall—or in July if he prefers. Clay has offered to work with Paul if needed. Information about that trip has to be given to Carol so she can get it into the newsletter at the appropriate time.

Bart will have his **class on rock and mineral identification** in May, probably on a Saturday, at the Vogt/Bartels' house and will announce information when available. Bart is preparing written material and will have lots of specimens to study. The class will probably take most of the day, so we can figure out lunch arrangements at the house. Because of space limitations, this first class will be open to Board members only but may be offered again to other GSOC members.

Next meeting will be at 10 a.m., April 9th, at Rosemary Kenney's house.

Beverly F. Vogt, GSOC Secretary

Editor's Note: We'd love to thank Beverly Vogt for all her hard work as secretary and quite a few other important contributions to the society. Three cheers Bev!

NEW BOOK CORNER

by Dr. Paul Hammond

Brian Switer, writing in the Wall Street Journal, issue Saturday-Sunday, January 22-23, 2011, section D, page 9, in an article entitled "Rock Of Ages," reviews a most intriguing book, **The Planet in a Pebble**, Oxford, 256 pages, $27.95, by Jan Zalasiewicz, a Welsh geologist. Author Zalasiewicz describes an ordinary polished stone, supposedly picked from the Welsh coast, and describes it in considerable detail—its origin, its mineral content and composition, and history. The reviewer, Brian Switer, concludes with the paragraph, "Although the records contained within the pebble are often incomplete and are not always preserved in high fidelity, they still allow us to feel the rhythms of planetary change. In some ways the pebble is like one of the new computer chips, tightly packed with more information than one could ever surmise from gazing on its smooth surface."

Switer, a research associate at the New Jersey State Museum is also credited with a fine book, **Written in Stone: Evolution, the Fossil Record, and Our Place in Nature**.

Searles Lake Story

Synopsis of the January 14, 2011 GSOC Friday night lecture by Joseph Cohen, GSOC member and intellectual-property lawyer at Stoel Rives LLP, in Portland, Oregon
by Carol Hasenberg

To kick off the new year, GSOC traveled south to the California Basin and Range country listening to the talk by GSOC member Joseph Cohen. The topic of the lecture is an important producer of industrial minerals and geological curiosities, Searles Lake. Located southwest of Death Valley and south of Mt. Whitney and Owens Valley, Searles Lake is part of a series of basins which stair-step their way down from the Sierra Nevada mountains to the low point in Death Valley. From highest to lowest the basins are Owens, Indian Wells, Searles, Panamint, and Death Valley. During the recent series of Ice Ages beginning about 100,000 years ago, snowmelt produced a series of lakes in these basins that occasionally spilt over into the next lower basin. Searles Basin was the low point for a large lake that included Indian Wells Basin and itself, and so it collected a large amount of salts and minerals. Alternating layers of salt and mud built up on the bottom of the lake during periods of quiet and overflow. Today the basin is surface dry but the briny layers under the surface are mined for a plethora of minerals.

Searles Lake basin is a treasure trove of evaporite minerals, including trona, borax, halite, hanksite, sulfohalite, potash, searlesite, calcite, and many more. Salt-loving extremophilic bacteria live in the brine and add a beautiful pink color to the halite crystals that form in the brine. Any water that accumulates in the basin is very toxic and has a high pH. The concentration of salt is so intense that it will kill birds that unwittingly land in it. Trona pinnacles which are tens of feet high created by precipitation in the lakes history stick up in twisted shapes that give the landscape an alien quality.

European settlers in the region recognized the economic potential of the area. In the 1870's the Searles Brothers discovered that mining borax here was more profitable than mining gold in California. They developed a 20-mule train system which would carry the borax to the port of San Pedro. Since this time the Searles Lake area has been owned and worked by various mining operations. Today the parent company which owns the mine is an Indian Corporation. Their borax brand is called Three Elephant but the origin of the name is American, not Indian. The name is a play on the idea of a 20-mule train - three elephants must be so much more robust than the mules. The mining done today is liquid extraction – brine rich in minerals is pumped up from the lower layers and used in the manufacture of products such as detergents, glass and Pyrex.

Like many other extraction industries, the economic conditions produced by the borax mining has followed a boom and bust cycle. In its heyday in the 1950's, the nearby town of Trona was populated by some 6000 people with high employment. Royalties from the mines made this one of the richest school districts in California. The high school had 1500 students. Today the population of the town is 1500 with 100 high school students.

Geology buffs have a unique opportunity to get up close and personal with the Searles Lake treasures. Every year in early October, the lake is opened to rock hounds with field trips conducted through the Searles Lake Gem & Mineral Society. This so-named Gem-O-Rama attracts many people every year and there are several different

flavors of field trips for the mineral buffs. Joseph Cohen has attended the Gem-O-Rama and showed GSOC photos from the events and the minerals he collected.

Trips offered include the Mud, Blow Hole, and Pink Halite (aka Brine Pit) trips. As their names imply, participants are likely to get caked by mud and salt. For the mud trip, backhoes get mud from the lake and spread it over the ground the day before the trip. Big crystals of hanksite are collected from the mud by the participants. Some groups working the mud set up huge troughs of brine to wash off the mud. The brine is a lot less caustic than plain water to the crystals.

In the Blow Hole trip, navy demolition experts from the nearby China Lake Naval Air Station are hired to plant charges in the ground at 600 ft depths. These produce geysers of brine which shoot crystals all over the ground surrounding the blow holes. This trip is popular because it is a lot less muddy for the participants. The Pink Halite trip travels to areas where there are pits of brine in which large clusters of pink halite crystals grow. One has to get in the brine under the lip of the edge of the pit to collect the crystals. Oh yes, and the brine really stinks because the bacteria which color the crystals produce a sulfurous odor.

These minerals collected at the Gem-O-Rama are corroded by the humidity in the air so that collectors need to store them carefully. Cohen sprays salad oil on most of his, except for the halite which is sensitive to that. These he keeps in plastic tubs with a desiccant. Some folks also use mineral oil to preserve their crystals.

EDENTATES IN THE WILLAMETTE VALLEY

Synopsis of the February 12, 2011, Fossil Fest lecture, "Digging up the Kings Valley Groundsloth," by Dr. William Orr, Professor Emeritus and Curator of the Condon Collections, Museum of Natural and Cultural History, University of Oregon
by Carol Hasenberg

It's always a treat to attend a lecture by William Orr because he makes the audience laugh as well as giving them excellent and interesting information about his topic. Dr. Orr began his 2011 Fossil Fest lecture by asking the audience how they found out about the lecture and Fossil Fest. Many folks raised their hands when he asked them whether they found out about it on the internet, or by word of mouth, but then he said that he found out by "reading it on the bathroom wall." He then introduced his co-researcher Mike Full as the real Ice Age Mammal specialist and said that "he's the one who should be giving this talk."

He then began to discuss his recent involvement in the excavation of Ice Age ground sloth skeletons in Kings Valley, Oregon (Benton County). The setting for the fossilization of these remains is the Willamette Valley, which is tectonic, not fluvial, in origin. The Willamette Valley is a broad basin situated between the Coast Range and Cascade Range of mountains and is gradually sinking. Someday it will fill with water like the Puget Sound. It has received a lot of sediment, especially since the Ice Age Floods from Lake Missoula in Montana filled the valley on numerous occasions with backwash from those massive floods. Small offshoot valleys like Kings Valley served as refuges for large mammals during this time.

Ground sloths were common animals in the Willamette valley during the Ice Age and did not die out until 11,000 years ago. They originated in South America during the Oligocene and spread north 3 million years ago when a land bridge developed between the two previously separated continents (i.e., North and South America). This land bridged caused a great many mammalian species to intermix between the two continents. Horses, elephants, dogs, cats, and deer spread south from North America, while edentates such as anteaters, sloths and armadillos spread north from South America.

Orr cited some examples of the North American mammals which included zebra-like or ass-like horses, the huge Ice Age bison, mammoths and mastodons, Smilodon saber-toothed cats, Canis dirus (Dire wolf), and short-faced bears. Many of these were huge and dangerous predators unmatched by any we have today. The north-bound mammals from South America included the Glyptodon, a huge armadillo that resembled the dinosaur Ankylosaurus in appearance but not ancestry, the Giant Anteater, and large ground sloths. These edentates were all dangerous animals in terms of human size and strength, but were outmatched by the North American predators. Despite this disadvantage, they were able to spread and thrive until the end of the Ice Age, and may have been pushed into extinction by the spread of another super predator on the scene, i.e. human beings.

Getting back to the Kings Valley excavation, Orr described the excavation site as being an old stock pond where the land-owner had discovered some bones and

had called in the paleontological experts to sort them out. The fossils were found in a matrix of black anoxic mud and the site has to be continuously pumped to keep out the water. These conditions were pretty good at keeping vandals off the site, Orr said. The excavation team worked the site one spot at a time, removing buckets of sediment and screening them in a water tank. Using this method nothing larger than ¼" in size was missed. After describing the gooey site conditions Orr joked that his part of the excavation was to "set excavation policy." His wife Elizabeth and youngest daughter also kept the records for the excavation.

Some examples of some of the items found in the excavation included teeth, skull parts, larger bones, finger digits, claws, and dermal ossicles of at least 3 Harlan's ground sloths. The teeth of a ground sloth are hipsodont like those of a horse, cow or deer, and are characteristic of animals which feed on rough forage. They are high-crowned and gradually wear down over the life of the animal. Orr estimates that ground sloths had a life expectancy of about 10 or 12 years based on the teeth. Ground sloth teeth are also characteristically dumbbell-shaped in cross section.

The finger bones found faithfully maintained the mammalian digit formula of 2-3-3-3-3 digits per finger. The claws on the front feet were huge and caused the animal to turn in their front feet as they walked on all fours. Rear foot bones included knobby heel bones which aided the animal in rearing up on its hind legs.

The dermal ossicles are a very fascinating characteristic of ground sloths. Their skin was about 2 inches thick (they've found preserved pieces of it) and had these little bones imbedded in it shaped like rough diamonds. These little bones acted like "the metal studs in a motorcycle hoodlum's jacket" to protect the animal.

Getting back to a more general discussion of ground sloths, Orr referred to another western species, the Shasta ground sloth, which was lighter in build than the Harlan's. Back east the largest ground sloth, Megatherium, was common, and President Thomas Jefferson was known to have dug up some of their remains on his property. In fact, he warned Lewis and Clark to look out for ground sloth and elephants on their western explorations, as he did not understand that these animals were extinct. These animals all went extinct about 11-12 thousand years ago. The large herbivores preceded the large carnivores into extinction.

In fact, Orr describes the edentates in general as a "big collection of losers" – primitive herbivores who have a relatively small niche in modern day fauna. Their descendants include the armadillo, anteaters, tree sloths, and a small Asian ground sloth relative called the pangolin. This animal is distinct in being the only scaled mammal but unfortunately it has been found to be edible by humans. The edentates have been eclipsed by more efficient mammals in the competitive arena of nature.

REFERENCES AND ADDITIONAL READING

Fossil Fest 2011 Event Details, OSU Calendar includes a description of the talk:
http://calendar.oregonstate.edu/event/49143/

University of Oregon Museum of Natural and Cultural History Condon Collections site:
http://pages.uoregon.edu/mnh/Pages/condon_collections.html

Wikipedia sites:
The Xenarthra page on Wikipedia
http://en.wikipedia.org/wiki/Edentates includes anteaters, sloths, and armadillos.
The ground sloth page on Wikipedia includes info on Harlan's ground sloth:
http://en.wikipedia.org/wiki/Ground_sloth.
The Harlan's Ground Sloth page:
http://en.wikipedia.org/wiki/Paramylodon_harlani.

Return to the Ice Age: The La Brea Exploration Guide:
http://www.tarpits.org/education/guide/index.html

IN MEMORIAM

PSU Professor Gilbert Thomas Benson

The following is an excerpt of an obituary published in The Oregonian on February 6, 2011:

"Tom Benson was born in Los Angeles and moved to Portland as a child. He was the … grandson of Portland businessman and philanthropist Simon Benson. ... Tom fondly remembered camping as a Boy Scout in Tryon Creek State Park, as well as one of his first jobs working on log rafts for a local tugboat company. After attending Stanford University, Tom spent several years as a geologist for Texaco. He then earned a doctorate from Yale University and began teaching in 1962 at the University of Oregon. In 1968 he moved to Lake Oswego and spent the remainder of his career as a professor of geology at Portland State

University…Remembrances may be made to the Oregon Historical Society or Portland State University."

For the full text of the obituary see the Oregonian website:http://obits.oregonlive.com/obituaries/oregon/obituary.aspx?n=gilbert-thomas-benson&pid=148426885

Geological Society of the Oregon Country Activities:

ANNUAL EVENTS: President's Field Trip—Summer or Fall; Banquet—March; Annual Business Meeting—February.

FIELD TRIPS: About 4 per year. Fees: see field trip announcements on the calendar next page.

GSOC LIBRARY: Rm. 69, Cramer Hall, Portland State University. Open 7:00 p.m. prior to meetings.

PROGRAMS: Second Friday evening most months, 7:30 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon.

MEMBERSHIP: Per year from January 1: Individual--$25, Family--$35, Junior (under 18)/Student--$15. Membership applications are available on the website www.gsoc.org.

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Geological Society of the Oregon Country, P.O. Box 907, Portland, Oregon 97207

TRIP LOGS: Write to the same address for names and price list.

APPLICATION FOR MEMBERSHIP
THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Name_____ **Spouse**_____

Children under age 18_____

Address _____ **City** _____ **State** ___ **Zip**_____-_____

Phone (_____**)**_____-_____ **Email address**_____

Geologic Interests and Hobbies_____

_____

Please indicate Membership type and include check for appropriate amount:

Individual $25.00 _____ **Family $35.00** _____ **Student $15.00** _____

Make Check Payable to: **The Geological Society of the Oregon Country**
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