

**GEOLOGICAL SOCIETY OF
THE OREGON COUNTRY
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**THE
GEOLOGICAL
NEWSLETTER**

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

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ACTIVITIES:

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

FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.

GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details

GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.

PROGRAMS: Second Friday evening most months, 8:00 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon.

MEMBERSHIP: Per year from January 1: Individual--\$20.00, Family--\$30.00, Junior (under 18)/Student--\$10.00.

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VOL. 72, NO. 1
JANUARY, 2006

Charles Carter, President, 503-469-8353, chcarter39@hevanet.com
Calendar Editor, John Teskey, 503-641-7746, lawlib@Teleport.com

JANUARY ACTIVITIES

Friday Evening Talk, January 13, 8:00 P.M., "What Soil Produces the Best Pinot Noir in the Northern Willamette Valley of Oregon?" Dr. Scott Burns of the Portland State University Geology Department explains the terroir, or the northern Willamette Valley's relationship of geology, soils, and climate to the outstanding quality of its Oregon pinot noir wines. A wine tasting will follow the presentation. **Room S17, Cramer Hall, Portland State University, 1721 SW Broadway – between Montgomery and Mill. (Room S17 is on the sub-basement level of Cramer Hall, directly below the geology department's main office)**

No Wednesday Seminar scheduled for January

FEBRUARY ACTIVITIES

Friday Evening Talk, February 19, 8:00 P.M., Dr. David Taylor, Oregon palaeontologist and president of the NW Museum of Natural History Association will speak on the palaeontology of Oregon during the Jurassic period. **Room S17, Cramer Hall, Portland State University, 1721 SW Broadway – between Montgomery and Mill. (Room S17 is on the sub-basement level of Cramer Hall, directly below the geology department's main office)**

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**Calendar items must be received by 15th of preceding month.
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Dues are due!

BOARD MEETING NOTES

GSOC Board Meeting of December 10, 2005

The meeting was called to order the home of Rosemary Kenney. Board and GSOC members present included Charles Carter, Bonnie Prange, Beverly Vogt, Marvel Gillespie, John Teskey, Richard Meyer, Clay Kelleher, Tara Schoffstall, Janet Kaye-Rasmussen, Rosemary Kenney, and Richard Bartels.

Bonnie Prange announced that the January speaker will be Dr. Scott Burns of Portland State University, speaking about soils and wine, and the February speaker will be Dr. David Taylor, PSU adjunct faculty member, speaking about Oregon paleontology.

Dr. Andrew Fountain of PSU told GSOC at the December 9th meeting that the PSU Geology Department wants to have more involvement with GSOC. One suggestion is that some PSU geology trips be open to GSOC members. These trips include the central Oregon trip in the spring, the winery tour in the summer, and the coastal trip in the fall. Bev and Tara will act as liaison with PSU on this matter.

PSU Geology also wants to move the GSOC library from its present location to a different room, probably at the end of the current school year. Issues to be discussed include security of library material, security for AV supplies, who will pay for the new shelves, time frame, who will do the move, getting rid of obsolete material, disposition of the safe, etc. A new library committee consisting of Diana Gordon, John Teskey, and Rosemary Kenney was formed. Charlie will contact Diana to see if she will chair the committee.

A motion was passed to continue our domain registration.

The Annual Banquet was discussed. It will be on March 12 at the Rhinelander. Charlie will find the speaker. Marvel will chair the banquet committee. Janet Kaye-Rasmussen volunteered to do the place cards, and John Teskey will handle the PA system.

Marvel may ask other GSOC members to help her if she needs them.

The next meeting is scheduled for January 28th, 2006, at Rosemary's house.

Respectfully submitted,

Beverly Vogt, Secretary

WHAT IS HAPPENING TO THE GLACIERS OF THE AMERICAN WEST AND WHY?

Synopsis of a GSOC Friday evening talk by
Andrew Fountain, Portland State University
Geology Professor, December 9, 2005

For the past several years, Dr. Andrew Fountain has been researching the condition of glaciers in the American West. His project is funded by the National Science Foundation and NASA; and a number of institutions, including Portland State University (PSU), the US Geological Survey (USGS), the National Park Service (NPS), and Portland Community College (PCC), have been involved in the research.

Glaciers do a number of important things in their interaction with their environments. They store water, shape the landscape, record climate change, and respond to climate change. It is the final of these four actions that is addressed in the glacier research of this project.

Why study glaciers in the continental United States? Normally, when we think about glaciers, we think of places in high latitudes like Alaska, where there are numerous glaciers. Well, it is the abundance of glaciers in Alaska that is the problem. The number of glaciers to be studied must be large enough to produce statistically meaningful results, but small enough to be manageable. Plus, the glaciers are

much easier to study if the area in which they occur has been well mapped. This rules out Alaska, parts of which have not been well mapped at all. Luckily, there are only approximately 8400 glaciers in the lower 48 states, and with a small army of graduate students, they could be studied.

How does the research determine changes in glaciers, and through this, changes in climate? The primary method of Fountain's research was to determine changes over time in glaciers' areas on maps, and from this to determine hydrological effects, volume change, ecological effects, and heat exchange over time. The net mass change (area and volume) of a glacier can be used to determine surface, mass, and energy exchange, which can provide information about changes in local meteorological conditions. Also, combining data from a number of glaciers and identifying trends can lead to insights about glacial evolution and large-scale changes in climate.

In order to do these calculations, Fountain and his researchers collected existing data, using USGS 7-½ minute quadrangle maps dating from the late 1950's to the 1980's that showed outlines of glaciers to determine locations of glaciers and their approximate areal extent. Then, changes in glacial area were determined with data from a number of sources, including air photos, historic maps, repeat photography (photographs taken at the same locations and the same time of year), and satellite imagery. Some of these sources are detailed in the websites listed below. In addition to the photos and maps, a detailed database of meteorological data from Ohio State University was also used. Glacial characteristics were aggregated and graphed. This made it possible to make such observations as this: in the Sierras to the south, the climate is drier and glaciers are at higher elevations than in the Cascades to the north. Also, going from west to east from Washington state to Montana, average temperatures get lower with glaciers occurring at lower elevations.

Comparing photographs taken of the same glacier in different years is an interesting and powerful technique for determining glacier changes—if one can find historic glacier photos. Researchers had to

be careful to use photographs taken between mid-August and early October to avoid the effects of seasonal snow. Dr. Fountain showed photos of Grinnell Glacier in Glacier National Park, Darwin Glacier in Kings Canyon National Park, and one of his favorite glaciers which is also one of the most-studied glaciers— South Cascade Glacier at the head of Lake Chelan in eastern Washington. These photos can be seen on the websites listed below.

And what are the results of all this research? For the most part, glaciers are definitely shrinking in the lower 48 states, and other studies elsewhere have confirmed this is happening globally. Some of the changes noticed in glaciers are believed to be the last effects of a climatic event called the Little Ice Age, which ended in the mid to late 1800's in the United States. The warming climatic trend melted glaciers in the first half of the twentieth century. During the 1950's and 1960's, glacial areas remained fairly steady, and then glaciers started shrinking again from the 1970's to the present. This is the result of warmer winters and may demonstrate manmade climatic changes.

Researchers learned that the smaller the glacier is to begin with, the greater the percentage of mass change that has occurred. Dr. Fountain believes that this is because the larger the glacier, the deeper the valley it has eroded, and that glaciers are retreating into more protected environments, making them more "recession-proof".

In one area of the country, glaciers are not receding. The glaciers on the lee side of the Rocky Mountain Front are built from wind-blown snow and do not change much.

Another very interesting discovery was made by a persistent graduate student studying Wheeler Glacier in Great Basin National Park. The actual glacier area was much larger than is shown on the map because most of the glacier is covered with rock. Its extent is clearly seen from the air photos or satellite imagery studied by the researchers. Since making this discovery, the researchers were also able to identify a number of other rock-covered glaciers and increase the number of glacial areas in

the lower 48 states. The local example is Elliott Glacier above Cooper Spur on Mount Hood.

Lastly, changes in glaciers may indicate climatic changes wrought by industrialization. Although the extent of global warming is unknown at this time, Dr. Fountain is sure that once started it will have momentum lasting well beyond any attempts to correct it. An upcoming global effort to study climate change will happen during the International Polar Year in 2007-2008, similar to the International Geophysical Year which occurred in the 1950's. We should all support this effort to observe and calculate changes to the climate of our world.

Carol S. Hasenberg

Further reading:

Andrew Fountain Home Page

<http://glaciers.pdx.edu/fountain/> Dr. Fountain has an extensive list of publications on his website.

Websites for glaciers at Portland State University:

Glacier Research at PSU

<http://www.glaciers.pdx.edu/>

Glaciers of the American West

<http://glaciers.pdx.edu/gdb/maps/>

Glacial simulations

<http://www.glaciers.pdx.edu/GlacierModels/>

Upper Skagit River Basin glaciers

<http://glaciers.pdx.edu/Skagit/>

USGS Benchmark Glaciers Page

<http://ak.water.usgs.gov/glaciology/Default.htm>

OF SOIL AND WINE

What soil produces the best pinot noir in the northern Willamette Valley of Oregon?

Terroir, the relationship of geology, soils, and climate to the quality of wines is so important to winemakers who want to have the best soil possible to produce the best wines, especially pinot noir. In

a completely updated study of over 210 vineyards (5249 acres) in the northern Willamette Valley, the heart of the winemaking area of Oregon, two soils are the dominant varieties of the wineries, but three other soils show great promise. The two dominant soils are Jory that is developed on basalt bedrock and Willakenzie that is developed on marine sediments. Both are very old soils that are well-drained, on south-facing slopes, red, xeric moisture regimes and lie between 300' and 800' in elevation. The other three are the Laurelwood, Nekia and Yamhill soils developed on basalt bedrock. Soils developed on Missoula Flood deposits on the valley floors are not good wine soils because they are not well drained, and they have too many nutrients. A wine tasting will follow the talk and powerpoint presentation to help the audience learn more about the local terroir!

Dr. Scott Burns, Professor of Geology, Portland State University

GSOC MEMBER SENT TO HEALTH FACILITY

Dear Long-Time GSOC Members,

If you have been trying to contact Robert Richmond, long-time GSOC volunteer, he has been moved into Willamette View Health Center. He is not strong enough this year to send out his usual batch of Christmas greetings but we believe he can receive visitors.

All his mail is being forwarded to his daughter Jean in Colorado, who does his secretarial work. You may send greetings to Robert via her address:

Mr. Robert E. Richmond
Unit 3
1090 Vail View Drive
Vail, CO 81657-4045

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compiled by Rosemary Kenney

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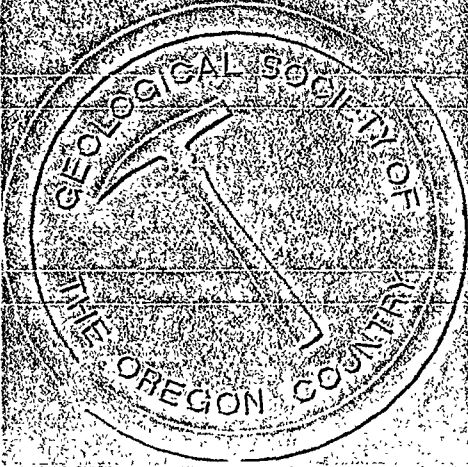
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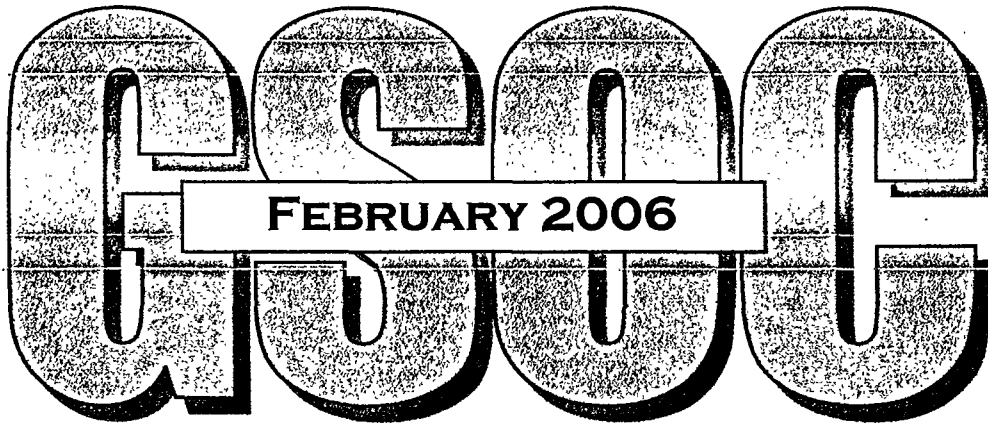
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VOL. 72, NO. 2
FEBRUARY, 2006

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MARCH ACTIVITIES

GSOC'S 71ST Annual Banquet is at the Rheinlander Restaurant, 5035 N.E. Sandy Blvd. on Sunday, March 12th at 12:30 P.M. The banquet speaker is Dr. Peter Clark, Professor of Geosciences, Oregon State University. Dr. Clark will speak on the topic, "Climate Change Present, Past, and Future: What We Have Learned About What To Expect". To register for the banquet, please go to the last page of this newsletter.

REMINDER

ANNUAL DUES ARE PAYABLE STARTING JANUARY 1, 2006

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Terroir and Oregon's Pinot Noir Wine

synopsis of the Friday, January 13 talk, "What Soil Produces the Best Pinot Noir in the Northern Willamette Valley of Oregon?" by Dr. Scott Burns of the Portland State University Geology Department. Dr. Burns discussed the relationship of geology, soils, and climate to the outstanding quality of the northern Willamette Valley's pinot noir wines. A wine tasting and vote followed the presentation.

Terroir, a French word meaning "from the earth" was the theme of Dr. Burns' talk and also the topic of a recent research project conducted by Burns and graduate student Dion Starpiece at Portland State University. In their study they surveyed the soil types preferred by Oregon pinot noir wine grape growers in the northern Willamette Valley. They looked at soil bedrock type, soil age and depth, elevation of the vineyard, slope steepness and orientation, and other factors influencing the terroir of the grapes.

Before discussing the results of the survey, Dr. Burns explained that fine wine quality is influenced by **five main characteristics**: grape varieties, soil and other geological elements, weather and climate, the winemaker, and the vineyard management. He quoted local wine producer Dick Erath, who says that 80% of the quality of a wine is derived from the vineyard and 20% comes from the winemaker.

Providing a more in-depth discussion of the terroir characteristics of soil, bedrock, and climate, Dr. Burns discussed the **soil characteristics** of texture, color, structure, age, depth, and drainage. When growing grapes for wine, it's important to provide good drainage and reduce the vigor of the grape

plants, so that they will allocate more of their resources to producing fruit. Deep soils are good because wine grapes will send roots down 20 feet or more. In the Willamette Valley, pinot noir grapes have their vigor reduced mostly by growing the grapes on nutrient-poor soils, which are generally old soils whose nutrients have been leached out.

Other terroir characteristics are **elevation, slope, and orientation**. Wine grapes grow best in the Willamette Valley at elevations between 300 and 800 feet. Dr. Burns explained that soils at elevations less than 300 feet are generally nutrient-rich Missoula Flood sediments, and elevations above 800 feet reduce the growing season so much that the grapes do not produce the needed sugar content to make the wine. The optimal vineyard slope is 7 to 8 degrees, and successful vineyards have south-, southeast-, or southwest-oriented slopes. Cold air drainage must be avoided in the siting of the vineyard as frost can destroy a carefully tended wine crop.

Terroir and **grape varieties** are also closely related, since **climate** affects what types of grapes one can grow successfully. Oregon was put on the map for growing pinot noir grapes in 1979 by David Lett's astounding international award for his 1975 Eyrie Vineyards pinot noir, which nearly surpassed the best wines from Burgundy. Since then, the number of vineyards and wineries in Oregon has increased considerably, and in addition to the flagship pinot noir, winemakers produce pinot gris, pinot blanc, Riesling, and other wine varieties. Colder climate grapes are more successful in the northern Willamette Valley; hotter climate varieties such as cabernets and merlots are grown more successfully elsewhere (such as eastern Washington, southern Oregon, and California). However, all wine grapes grow best in climates which have a xeric moisture regime, in which the end of the growing season is very dry.

In a couple of interesting **comparisons**, Dr. Burns contrasted the northern Willamette Valley with eastern Washington, which produces some local cabernets and merlots. Eastern Washington has about 2600 hours above 50 degrees F. per year, whereas the northern Willamette Valley has about

2000-2200. Also, in eastern Washington, the vigor of the grapes is reduced primarily by controlling the water rather than by limiting the nutrients. The other comparison was to the soils of Burgundy, which have a high limestone content, yet both Burgundy and the northern Willamette Valley have a similar climate and xeric moisture regime.

In the study by Dr. Burns, over 200 vineyards were surveyed. Overwhelmingly, the soils preferred by the vineyard owners can be described as red in color, well drained, old to very old in age, and developed on Columbia River Basalt or marine sediments bedrock. Windblown loess is often mixed into several of the soil types, which reduces the soil age somewhat. The leading five soil types found in the surveyed vineyards are Jory, Willakenzie, Laurelwood, Yamhill, and Woodburn. Jory, Laurelwood, and Yamhill are basaltic in origin. Willakenzie has a marine sediment origin. Woodburn soil is a nutrient poor Missoula flood deposit good for growing white grapes. An up-and-comer soil in the vineyard business is Nekia, also of basaltic origin.

Summing up the results of his study, Dr. Burns told GSOC that 96% of vineyard soils in the northern Willamette valley can be classified as "old soils", with 56% of basaltic or basalt and loess origin and 30% of marine sediment origin. He also jokingly referred to his "Poison Oak Hypothesis" for siting a vineyard, which was that vineyards that produce good wine are also good places for growing poison oak.

The climax of the talk was the wine tasting. Dr. Burns had wine to taste from the Chehalem Winery; one of the wines was from their Ridgecrest vineyard and the other was from their Stoller vineyard. Since the winemaking procedure and age were the same for the two vintages, we were able to attribute the differences in taste to the soil types. We weren't told the soil types until after we'd voted. The Ridgecrest vintage was preferred by 37 tasters, and it was a darker color than the Stoller. To me it had a spicy, lighter taste, and was a tiny bit musty on the aftertaste. The Stoller vintage was preferred by 20 tasters, had a redder color and a longer finish. To me it had a richer bouquet and a somewhat tarry

taste. I preferred the Ridgecrest, and discovered it was from Willakenzie soil. The Stoller was from Jory soil. It was an interesting finish to a very interesting talk.

Carol Hasenberg

GSOC HISTORY SERIES

Dear GSOC Members,

I've decided to run a series of GSOC reprint articles from past Geological Newsletter articles. I think it's important for today's GSOC members to read about the people who started or have been active in the organization and their accomplishments. I think you'll be delighted as I have been to learn about our organization's links to important pieces of Oregon history.

My first piece is a reprint from the December 1970 Geological Newsletter. It is the obituary for Dr. Edwin T. Hodge, the founder of our organization.

Carol Hasenberg

FOUNDER OF GEOLOGICAL SOCIETY OF THE OREGON COUNTRY DIES

Dr. Edwin T. Hodge, professor of geology at Oregon State University until his retirement, was found dead at his home at 2915 N. W. Luray Terrace on November 7. After cremation, his ashes were dispersed on the Skyline West Hills. He was the husband of the late Lydia Herrick Hodge, artist, educator and executive secretary of the Oregon Ceramic Studio, now known as the Contemporary Crafts Gallery. Her death occurred at 74 on September 17, 1960. Dr. Hodge was 81 on July 12.

On April 18, 1935, the Geological Society of the Oregon Country was formed from the nucleus of 100 students from the geology classes taught by Dr. Hodge at the Portland Extension Center of the University of Oregon. This society promotes the awareness of geological knowledge for its membership which is open to all interested persons.

Dr. Hodge was the first and sixteenth president of the society, and the membership has continued to grow during its 35 year life.

In an address to the society in 1945, Dr. Hodge stated, "It is my dream that this society sponsor a museum that will become the Smithsonian of the West." Dr. John Cyprian Stevens was appointed as the society's museum director and in 1946 OMSI was born. While his dream has taken on the form of technological push-button Oregon Museum of Science and Industry, the spark of its beginning is a tribute to Dr. Hodge.

Oregonians are especially indebted to this eminent geologist for his many publications, especially: "The Geology of North Central Oregon," "The Geology of the Lower Columbia River," and "Mount Multnomah -Ancient Ancestor of the Three Sisters." One of his signal contributions to economic geology is his 16 volume summary of the natural resources of the Pacific North West. These reports on the sources for iron ores, manganese, magnesia, silica, limestone, and clay have been used extensively by the electrochemical and electrometallurgical industries of the Northwest.

His record of employment includes being President of the British Bureau of Mines; Professor of Geology, University of Oregon and Oregon State University since 1920; Consultant to the U. S. Army Corps of Engineers 1932 -42 during which time he located the site for the Bonneville Dam, gave it its name, and supervised the foundation work. He was consulting geologist for the Round Butte Dam and Reservoir, and held many other executive positions on the staff of municipalities, state highway commissions, mining companies and surveys.

Internationally he was requested to make geological investigations in Uganda, Southern Rhodesia, South Africa, Belgian Congo, Ghana, Liberia, Egypt, Turkey, Greece, Italy, France, Japan, China, Manchuria, Philippines, Malay States, and all states of the United States including Alaska. This survey of the world for its minerals resulted in a 10 Volume report which is now housed in the historical files of the U. S. Army Corps of Engineers library.

Dr. Hodge was a member of many professional organizations and learned societies and held many honorary positions. He was Fellow and Life Member of the American Association for the Advancement of Science, President of the British Columbia Chamber of Mines; Fellow, Geological Society of America; Fellow, American Geographical Society; Fellow, Seismological Society of America; member International Geological Congress; member American Ceramic Society; and honorary member as well as founding president of the Geological Society of the Oregon Country.

Survivors of Dr. and Mrs. Edwin T. Hodge are a niece, Mrs. Marion Walker and her daughter Suzanne Walker.

Friends who wish to contribute a Memorial Fund for Dr. Hodge may send their gifts to the Geological Society of the Oregon Country, in care of OMSI at 4500 S. W. Canyon Road, Portland, Oregon.

Viola L. Oberson

Further reading:

GSOC readers: It was very difficult finding any references to Edwin T. Hodge on the internet. However, one I did find is that the Oregon State Department of Geology and Mineral Industries (DOGAMI) has put up a copy of the "Mount Multnomah" publication for sale through a website called 2Neat Books at this URL: <http://www.woodenski.com/2neat/state/oregon.htm#misc>

Here is the ad text if any of you are interested in acquiring this gem:

Mount Multnomah : Ancient ancestor of the Three sisters by Edwin T. Hodge. 1925 University of Oregon. 10x7", 158p., absolutely awesome vintage photos including mountain climbers, skier with one pole, fishermen, camp with tents and horses. Folded topographic map of the Three Sisters by Edwin T. Hodge. in pocket, 1:5,000. (folded corner on map. Map pocket torn at top. Text has bumped corner,

rubbed cover/spine and faintest discoloration along lower edge of cover).

A Heartfelt Thanks!

I want to express gratitude to the following people who helped me out during December's seminar on geology crafts. Thank you to Charlie Carter, Rosemary Kenney, and John Teskey for donating time, rocks, flowerpots, and socks. A Special BIG Thank You to Donna Schoffstall and Taylor Hunt, who donated most of the remaining rocks and supplies. I really appreciated everything you all did. As usual, you guys rock! (No pun intended!!!)

Unfortunately, the timing of the season didn't help much, so look for a second chance in the spring or early summer!

Tara Schoffstall

BANQUET SALES TABLE DONATIONS

John Newhouse will be accepting donations of books and other geology/natural history related items for the sale at the upcoming Annual Banquet.

John asks that you do NOT donate the following:

- NO rocks
- NO textbooks older than 5 years

For more information call John at 503/224-2156.

WINTER WEATHER IN OREGON(?)

Here are some websites to peruse for the climate in Oregon, so you can decide whether the weather this winter is within reason:

The Oregon Climate Service (OCS), located on the Oregon State University campus in Corvallis, Oregon, is the state repository for weather and climate information. They are affiliated with Oregon State University's College of Oceanic and Atmospheric Sciences (COAS).

Oregon Climate Service website – this has some pictures of the recent flooding:
<http://www.ocs.orst.edu/>

Oregon Climate Summaries from the Desert Research Institute, Western Regional Climate Center:

<http://www.wrcc.dri.edu/summary/climsmor.html>

NOAA (National Oceanic and Atmospheric Association), National Climatic Data Center:

<http://www.ncdc.noaa.gov/oa/ncdc.html>

Also the NOAA Snow Climatology site:

<http://lwf.ncdc.noaa.gov/oa/climate/monitoring/snowclim/mainpage.html>

Nominating Committee Results

The following slate of officers has been selected by this year's nominating committee:

President.....	Bonnie Prange
Vice President.....	Richard Bartels
Secretary.....	Beverly Vogt
Treasurer.....	Marvel Gillespie
Director, 3 years.....	Larry Purchase
Director, 2 years.....	Janet Kaye-Rasmussen
Director, 1 year.....	John Teskey

The slate of officers will be voted on and approved at the February monthly meeting.

The Nominating Committee members were Richard Bartels, chair, Rosemary Kenney and Charles Carter. Our thanks to the selected members and members of the Nominating Committee!

Don't forget that annual **DUES PAYMENTS** are due! Think about all those great member benefits for a mere annual fee of \$20 for an individual and \$30 for a family!

PS - If you joined GSOC in September or later, your 2006 dues are paid, good deal!!!

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY SEVENTY FIRST ANNUAL BANQUET

Speaker

The Geological Society of the Oregon Country will be having its 71st Annual Banquet on Sunday, March 12, 2006. The program topic will be "*Climate Change Present, Past and Future; What We Have Learned About What to Expect*", by Dr. Peter Clark, Oregon State University. Dr. Clark's research is the history and diagnosis of former glaciers, ice sheets and paleoclimatology. Quaternary stratigraphy is another interest of this editor of Quaternary Science Reviews. For more information you may visit his website at <http://www.geo.oregonstate.edu/people/faculty/clarkp.htm>.

Where and When

Location of the banquet will be the Rheinlander Restaurant, 5035 NE Sandy Blvd., Portland, Oregon. There is ample free parking next to the restaurant, behind the restaurant and across Sandy Blvd. Public transportation riders may get there by bus on the #12 Sandy Blvd. bus route. One may also take the MAX train to the Hollywood Transit Station, but will need to walk two blocks north to Sandy Blvd. to transfer to the Sandy Blvd. bus, which does not stop in the Hollywood Transit Station. Doors at Banquet Entrance open at 12:30 p.m. Dinner at 1:00 p.m. Program and speaker will begin at 2:15 p.m.

Menu

Waldorf Rotisserie Chicken Salad (chicken, apple, blue cheese, fresh organic greens)

Fresh Vegetable Pasta (spatzle, mushrooms, herbs & tomato) & green salad

Munich Sausage Trio (three German sausages, sweet & sour red cabbage, spatzle) & green salad

All dinners include warm rolls, butter, plum jam, apple strudel and hot beverage.

_____ Number of tickets at \$21.00 each (includes gratuity). Please indicate entrée choice. Also, if you have a table preference, please indicate it on the reservation.

Names of persons attending and meal choices:

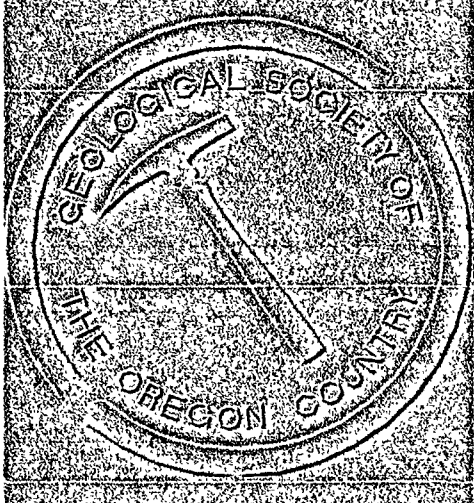
_____	Meal choice (circle one)	Chicken Salad	Pasta	Sausage
_____	Meal choice (circle one)	Chicken Salad	Pasta	Sausage
_____	Meal choice (circle one)	Chicken Salad	Pasta	Sausage
_____	Meal choice (circle one)	Chicken Salad	Pasta	Sausage

_____ Amount enclosed. *Reservations must be received by Saturday, March 4, 2006.*

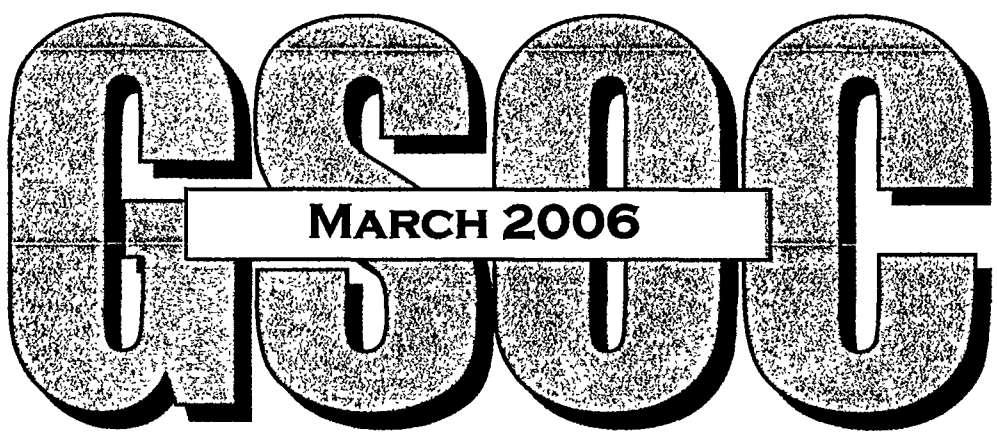
Please mail reservations and checks to GSOC, PO Box 907, Portland, OR 97207-0907

**GEOLOGICAL SOCIETY OF
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THE GEOLOGICAL NEWSLETTER

GEOLOGICAL NEWSLETTER

The Geological Society of the Oregon Country

P.O. Box 907, Portland, OR 97207

VISITORS WELCOME AT ALL MEETINGS

INFORMATION: www.gsoc.org

VOL. 72, NO. 3

MARCH, 2006

Charles Carter, President, 503-469-8353, chcarter39@hevanet.com

Calendar Editor, John Teskey, 503-641-7746, lawlib@Teleport.com

MARCH ACTIVITIES

GSOC's 71st Annual Banquet is at the Rheinlander Restaurant on Sunday, March 12th at 12:30 P.M.. The banquet speaker is Dr. Peter Clark, Professor of Geosciences, Oregon State University. The topic of the talk will be "Climate Change Past, Present and Future: What Have We Learned About What to Expect?" To register for the banquet, please go to the last page of the newsletter.

Seminar, Wednesday evening, March 15th, 8:00 P.M., "The Rise and Fall of Tides". What causes tides? How can we predict the times for high and low tides? Are oceans the only water bodies affected? Seminar led by Tara Schoffstall, GSOC Member, in Room S17, Cramer Hall, Portland State University, 1721 SW Broadway – between Montgomery and Mill Street. (Room S17 is on the sub-basement level of Cramer Hall, directly below the geology department's main office)

PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

REMINDER

ANNUAL DUES ARE PAYABLE STARTING JANUARY 1, 2006

**CHECK THE GSOC WEB PAGE FOR THE LATEST GSOC CALENDAR OF EVENTS,
WWW.GSOC.ORG, OR CALL JOHN TESKEY 503 641 7746**

Calendar items must be received by 15th of preceding month.

Call John Teskey, 503-641-7746 Lawlib@Teleport.com

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

2006-2007 ADMINISTRATION

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Editor:

Carol Hasenberg – 503/282-0547

Calendar:

John Teskey – 503/641-7746

Business Manager:

Rosemary Kenney – 503/892-6514

Assistant Business Manager:

John Newhouse – 503/224-2156

ACTIVITIES:

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

FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.

GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details

GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.

PROGRAMS: Second Friday evening most months, 8:00 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon.

MEMBERSHIP: Per year from January 1: Individual--\$20.00, Family--\$30.00, Junior (under 18)/Student--\$10.00.

PUBLICATIONS: THE GEOLOGICAL NEWSLETTER (ISSN 0270 5451), published monthly and mailed to each member. Subscriptions available to libraries and organizations at \$15.00 per year. Individual Subscriptions \$13.00 per year. Single Copies: \$1.00. Order from:

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.

WEBSITE: www.gsoc.org. Email address: gsoc@spiritone.com.

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 \$20.00 _____ Family \$30.00 _____ Student \$10.00 _____

Make Check Payable to: The Geological Society of the Oregon Country
PO Box 907
Portland, OR 97207-0907

GSOC HISTORY SERIES

Dear GSOC Members,

This month's installment of the history series cover reprinted articles from the January 25, 1945 Geological Newsletter and the February 1970 Geological Newsletters.

Carol Hasenberg

January 25, 1945 Geological Newsletter
from the

THE ORIGIN OF THE SOCIETY'S NAME

Possibly some of the newer members of the Geological Society of the Oregon Country ponder on the significance of the name applied to our Society, organized in, and holding its meetings in Portland. Every member should know the origin of this name and the meaning of its application to our group.

At the meetings held in the spring of 1935 to prepare a constitution and by-laws for the Society, considerable discussion developed in connection with choosing a name. Suggestions were numerous. The name finally chosen was that suggested by Dr. E. T. Hodge who gave such logical arguments that his suggestion was adopted unanimously by the committee. In effect, Dr. Hodge pointed out that, aside from Coast streams, the old Oregon Territory which comprised the present states of Oregon, Washington, and Idaho, and small parts of Montana and Wyoming, coincided with the limits of the Columbia River Drainage area within the United States, and contained the great Columbia basalt flows, the Cascades, the picture geology east of the Cascades, and the western slopes of the Continental Divide. It presented opportunity to study the geology of the Northwest in the vastness of the actions which produced the physiography of the region.

With respect to the use of the word "Country" instead of territory, that too was founded upon excellent logic" The territorial claims of the United States upon the Pacific Northwest were based upon the explorations of Lewis and Clark in 1806-7. By a treaty with England in 1846, the northern boundary was finally placed at the 49th parallel. The southern boundary was, of course, the 42nd parallel forming the northern boundary of what is now the states of California, Nevada, and Utah at that time under the sovereignty of Mexico where it remained until the close of the Mexican War in 1848. Since the western boundary to the Louisiana Purchase contiguous to this area was along the crest of the Rocky Mountains, this line of demarcation formed the eastern boundary of the Oregon Territory. This vast area was popularly referred to in the parlance of the day as the "Oregon Country"; as indeed it was. It is not only a political province, it is also a logical economic entity.

Passing time to the extent of ten years justifies the selection of the name. The years ahead of the Society possess great potentialities in study and exploration.

F. L. Davis

February 1970 Geological Newsletter

AGE DATING AND RADIOACTIVE ISOTOPES

by Dr. Marvin H. Beeson

Before Roetgen discovered radioactivity in 1895, no really good method existed for the determination of the absolute ages of rocks. In special circumstances ages in sedimentary layers were determined by counting seasonal layers or by multiplying the thickness of strata by an average rate of deposition, etc. These methods of age determination are extremely limited and contain many sources of error. Geologists were not extremely hindered by the inability to determine absolute ages, since the geologic history of an area can be reconstructed by the determination of relative ages.

The determination of relative ages of rocks is based on scientific observations which go back 150 years. Prominent contributors were William "Strata" Smith who in approximately 1800 recognized a definite sequence at rocks and fossils, and Charles Darwin who put forth the theory of evolution in 1859. Their discoveries are the basis for the two fundamental laws of stratigraphic correlation, viz. the Principle of Stratigraphic Superposition and the law of Faunal Succession. From these laws geologists have constructed the Geologic Column, a composite of all known strata in a column on the basis of fossils.

The calibration of the Geologic Column is based on the determination of/absolute ages of rocks. This has been done in the last 50 years almost exclusively by the use of radioactive isotopes. Absolute dating did not alter the relative time scale, but it did expand it. The age of the earth, and of most rocks, were found to be much greater than formerly believed. This implies that most geologic processes proceed at a very slow rate.

Radioactive dating is possible because

1. Radioactive isotopes decay at a constant rate—law of radioactive decay.
(See Radioactive Decay chart on page 14)
2. Radioactive elements with a wide range of half-lives are present in the earth.
3. Parent and daughter isotopes can be determined analytically. -

Assumptions made in radioactive dating are:

1. That the half-life is accurately known. ~
2. That the sample analyzed is representative of the rock being dated.
3. No gain or loss of parent or daughter isotope since the rock formed..
4. Daughter present at time of formation must have either been zero or determinable.

(Isotopes often used for radioactive dating are on the chart on opposite page.)

Since materials used for radioactive dating are usually from igneous rocks, the ages of adjacent sedimentary rocks must be determined by geologic observations which indicate relative ages. Thus,

both relative ages and absolute ages are important in calibrating the geologic column.

Recently two new methods of correlation have become important in geologic dating. First, remnant magnetism studies have shown that at times in the earth's past the polarity of the earth has changed. Since rocks formed at these times contain a record of the then existing polarity, a stratigraphic column based on the polarity changes of the earth is being constructed. It is a great aid in dating rocks, especially Tertiary volcanic rocks and deep ocean sediments. Second, trace element abundances in volcanic ashes are proving to be useful in accurately correlating isolated ash layers. Since an ash layer is deposited in a geologic instant, the determination of an absolute age of the ash in one locality can be extended to other deposits from the same volcanic eruption.

(This summary, prepared by Dr. Marvin H. Beeson, is from his lecture to the Society on December 12, 1969)

Here is a reprint of the editor's more recent article for comparison:

Radiometric Dating

Adapted from the USGS publication, "Geologic Time"

A chemical element consists of atoms with a specific number of protons in their nuclei but different atomic weights owing to variations in the number of neutrons. Atoms of the same element with differing atomic weights are called isotopes. Radioactive decay is a spontaneous process in which an isotope (the parent) loses particles from its nucleus to form an isotope of a new element (the daughter). The rate of decay is conveniently expressed in terms of an isotope's half-life, or the time it takes for one-half of a particular radioactive isotope in a sample to decay. Most radioactive isotopes have rapid rates of decay (that is, short half-lives) and lose their radioactivity within a few days or years. Some isotopes, however, decay slowly, and several of these are used as geologic

clocks. The parent isotopes and corresponding daughter products most commonly used in radiometric dating are listed below:

Parent Isotope	Stable Daughter Product	Currently Accepted Half-Life Values
Uranium-238	Lead-206	4.5 billion years
Uranium-235	Lead-207	704 million years
Thorium-232	Lead-208	14.0 billion years
Rubidium-87	Strontium-87	48.8 billion years
Potassium-40	Argon-40	1.25 billion years
Samarium-147	Neodymium-143	106 billion years
Carbon-14	Nitrogen-14	5730 years

The mathematical expression that relates radioactive decay to geologic time is called the age equation and is:

$$t = \frac{1}{\lambda} \ln \left(1 + \frac{D}{P} \right)$$

Where t is the age of the rock or mineral specimen
D is the number of atoms of a daughter product today,

P is the number of atoms of the parent isotope today,

ln is the natural logarithm of the expression in parentheses,

And λ is the appropriate decay constant.

The decay constant for each parent isotope is related to its half-life, $t^{1/2}$, by the following

$$\text{expression: } t^{1/2} = \frac{\ln 2}{\lambda}$$

Dating rocks by these radioactive timekeepers is simple in theory, but the laboratory procedures are complex. The numbers of parent and daughter isotopes in each specimen are determined by various kinds of analytical methods. The principal difficulty lies in measuring precisely very small amounts of isotopes.

The potassium-argon method can be used on rocks as young as a few thousand years as well as on the oldest rocks known. Potassium is found in most

rock-forming minerals, the half-life of its radioactive isotope potassium-40 is such that measurable quantities of argon (daughter) have accumulated in potassium-bearing minerals of nearly all ages, and the amounts of potassium and argon isotopes can be measured accurately, even in very small quantities. Where feasible, two or more methods of analysis are used on the same specimen of rock to confirm the results.

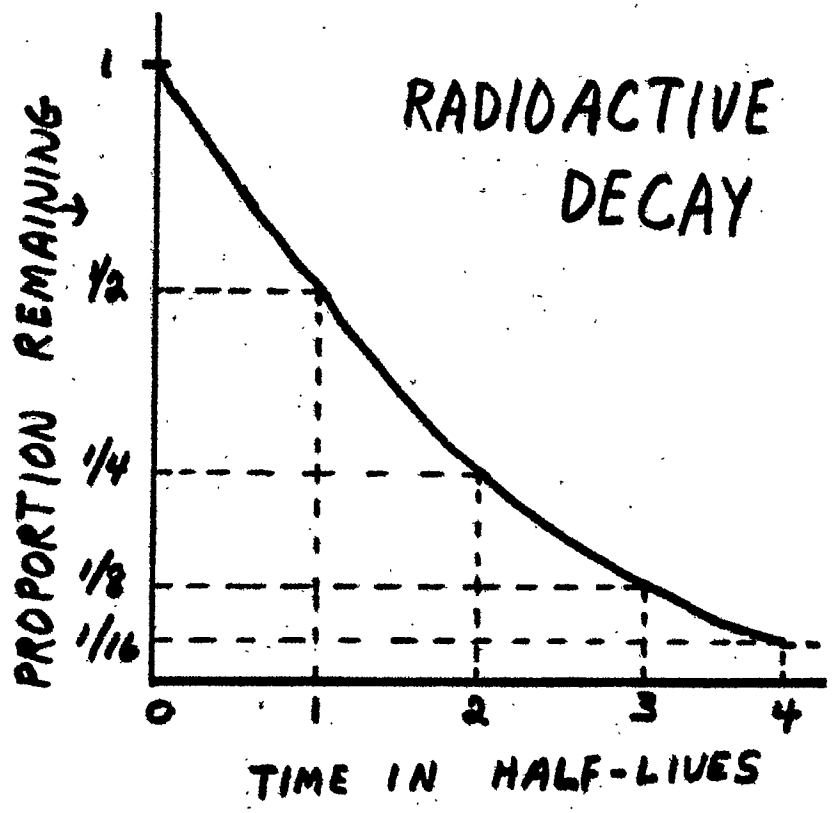
Another important atomic clock used for dating purposes is based on the radioactive decay of the isotope carbon-14, which has a half-life of 5,730 years. Carbon-14 is produced continuously in the Earth's upper atmosphere as a result of the bombardment of nitrogen by neutrons from cosmic rays. This newly formed radiocarbon becomes uniformly mixed with the nonradioactive carbon in the carbon dioxide of the air, and it eventually finds its way into all living plants and animals. In effect, all carbon in living organisms contains a constant proportion of radiocarbon to nonradioactive carbon. After the death of the organism, the amount of radiocarbon gradually decreases as it reverts to nitrogen-14 by radioactive decay. By measuring the amount of radioactivity remaining in organic materials, the amount of carbon-14 in the materials can be calculated and the time of death can be determined. For example, if carbon from a sample of wood is found to contain only half as much carbon-14 as that from a living plant, the estimated age of the old wood would be 5,730 years.

The radiocarbon clock has become an extremely useful and efficient tool in dating the important episodes in the recent prehistory and history of man, but because of the relatively short half-life of carbon-14, the clock can be used for dating events that have taken place only within the past 50,000 years.

RADIOACTIVE ISOTOPES USED FOR DATING

ISOTOPE	HALF-LIFE	EFFECTIVE DATING RANGE	MATERIALS THAT CAN BE DATED
U-238/Pb-206	4.5×10^9 YRS.	10^7 YRS. - 10^{10} YRS.*	ZIRCON URANINITE PITCHBLEND
U-235/Pb-207	0.71×10^9 YRS.	10^7 YRS. - 10^9 YRS.	PITCHBLEND
K-40/A-40	1.3×10^9 YRS.	10^4 YRS. - 10^{10} YRS.	MUSCOVITE BIOTITE HORNBLende K-FELDSPAR WHOLE VOLCANIC ROCK
Rb-87/Sr-87	4.7×10^{10} YRS.	10^7 YRS. - 10^{10} YRS.	MUSCOVITE BIOTITE MICROCLINE WHOLE METAMORPHIC ROCK
CARBON-14	5730 ± 30 YRS.	0 - 50,000 YRS.	WOOD CHARCOAL PEAT ETC.

* AGE OF EARTH
 4.5×10^9 YRS.



MHB/GIF

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Munich Sausage Trio (three German sausages, sweet & sour red cabbage, spatzle) & green salad

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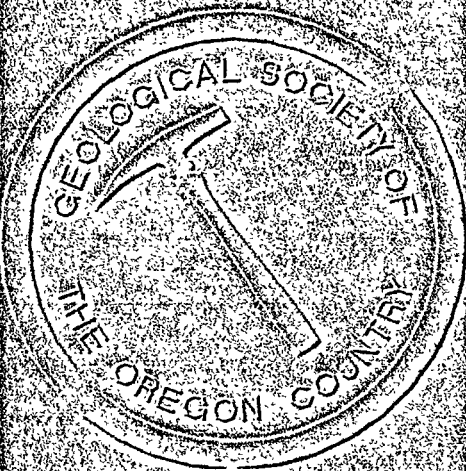
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_____ Amount enclosed. *Reservations must be received by Saturday, March 4, 2006.*

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THE GEOLOGICAL NEWSLETTER

Editor:

Carol Hasenberg – 503/234-0969

Calendar:

John Teskey – 503/641-7746

Business Manager:

John Teskey – 503/641-7746

Assistant Business Manager:

Rosemary Kenney – 503/892-6514

ACTIVITIES:

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

FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.

GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details

GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.

PROGRAMS: Second Friday evening most months, 8:00 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon.

MEMBERSHIP: Per year from January 1: Individual--\$20.00, Family--\$30.00, Junior (under 18)/Student--\$10.00.

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VOL. 72, NO. 4
APRIL, 2006

Bonnie Prange, President, 360-693-8396, bonnie@eco-land.com
Calendar Editor, John Teskey, 503-641-7746, lawlib@Teleport.com

APRIL ACTIVITIES

Friday Evening Talk, April 14, 8:00 P.M., Dr. Scott Burns, Portland State University Geology Department, will speak on "Geology of Spitzbergen (Norway): From Landslides to Polar Bears". Room S17, Cramer Hall, Portland State University, 1721 SW Broadway – between Montgomery and Mill. (Room S17 is on the sub-basement level of Cramer Hall, directly below the geology department's main office)

Seminar, Wednesday evening, April 19, 8:00 P.M., "Remnants of the Continental Glaciers." How do we know glaciers once covered most of North America? Come learn about the clues they left behind. All are welcome! Seminar led by Tara Schoffstall, GSOC Member, in Room 69, Cramer Hall, Portland State University, 1721 SW Broadway – between Montgomery and Mill Street.

PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

**CHECK THE GSOC WEB PAGE FOR THE LATEST GSOC CALENDAR OF EVENTS,
WWW.GSOC.ORG, OR CALL JOHN TESKEY 503 641 7746**

**Calendar items must be received by 15th of preceding month.
Call John Teskey, 503-641-7746 Lawlib@Teleport.com**

OFF TO NICARAGUA!

Note from the editor: Sorry to disappoint the fans of my annual pilgrimage to the sunny skies of Tucson in February for the Tucson Gem and Mineral Show. Perhaps next year or the following year I'll once again visit that extraordinary venue for some mid-winter adventures.

This month (March 22-April 3) I'm off to Nicaragua with some PSU engineering students, who are working on a humanitarian project and are receiving credit for it from the Civil and Environmental Engineering department at Portland State University. I'm very interested in visiting Central America from a geological perspective as well as a humanitarian one.

I've been very busy with preparations for this trip, and fortunately both the "GSOC History Series" and help from the faithful GSOC volunteers have "saved my bacon" in regards to my duties to the GSOC newsletter. I promise to write an article about the geology of Nicaragua when I return!

Hasta luego, Carol S. Hasenberg

CLIMATE CHANGE - PRESENT, PAST, AND FUTURE

Synopsis of talk presented by Dr. Peter Clark at the 2006 GSOC Annual Banquet on March 12, 2006

Dr. Peter Clark, a specialist in glacial geology, Quaternary stratigraphy, and paleoclimatology at the Geosciences Department of Oregon State University, presented a talk about climate change to a very fascinated GSOC audience at the 71st annual banquet. Dr. Clark's research in the history and dynamics of former glaciers and ice sheets and paleoclimatology, which includes regular contributions to the prestigious *Science* and *Nature* journals (and others), has given him expert status on the topics he discussed to the group on March 12.

The topics discussed in the March 12 talk included:

- current issues in climate change
- the greenhouse effect
- global warming

- the global warming debate
- signs of warming
- a paleo-perspective
- and future climate scenarios

Today people are worried about climate change that is being wrought by human population and fossil fuel consumption. Some of the ramifications of climate change being researched are global warming brought about by the greenhouse effect, sea level rise, deforestation, species extinctions and the reduction of genetic diversity, etc.

To understand how climate change is being brought about, one needs to know about the greenhouse effect, or heat retention properties of trace atmospheric gases in the earth's atmosphere. Short wave radiation from the sun comes into earth's atmosphere with little to stop it. It is absorbed by the earth, where it creates heat that is re-radiated as long wave radiation. This long wave radiation is then absorbed by gases in the atmosphere, including water vapor, carbon dioxide (CO₂), methane, nitrous oxide, and ozone. These gases are found in the atmosphere in trace quantities, measured in parts per million (ppm) or parts per billion (ppb). (The atmosphere of the earth is mostly composed of nitrogen, oxygen, and argon.) Greenhouse gases in the atmosphere cause the surface of the planet to be approximately 55°F. warmer than it would be otherwise.

Since the beginning of the industrial revolution, greenhouse gases in the atmosphere have begun to increase exponentially. Dr. Clark presented two tables of evidence for this from two different source data. The first was the ongoing atmospheric carbon dioxide measurements being conducted by Dr. Charles David Keeling on Mauna Loa in Hawaii since 1958. (See article called "The Keeling Curve" on page 20 of this newsletter.) The other curve is one obtained for atmospheric concentrations of CO₂ and other gases for the last 1000 years from Greenland ice core data. Past 1800, the graph starts to take off like a rocket.

One can also look at CO₂ content on a longer scale. Over the last 650,000 years, CO₂ had fluctuated between 250 and 300 ppm prior to the increases

measured since 1800. However, the last time the earth had as much CO₂ as it does now was between 10 and 20 million years ago. Dr. Clark said that one of the causes of fluctuations in atmospheric CO₂ levels throughout geologic time is the sequestering of CO₂ into limestone as it is formed.

Global temperature has also been measured and has been found to be 1 – 1 ½ degrees (°C) warmer than in 1860. There has also been a rise in global temperature in the past 1000 years. However, there is some regional variability in the temperature readings. Some areas have actually cooled. Dr. Clark showed a series of slides of global temperature changes and movies showing a series of climatic modeling results. Super computers have been used to conduct global climate models, which are very complex and memory-consuming. Such models are used to clarify whether the climatic changes we are experiencing are due to natural phenomena or human activity. The results of a global climatic study involving solar and volcanic temperature increases (natural) and CO₂ atmospheric increases (anthropogenic) demonstrate that only the model which combines the two comes close to matching the observed temperature changes.

In addressing the global warming controversy, Dr. Clark stated that there is widespread consensus in the scientific community that humans are responsible for the observed rise in temperature during the last 50 years. He went on to say that projected future trends will only further make clear that this is the case, if in fact it is – more and more signs will occur every year.

And what are the signs of global warming? Dr. Clark cited symptoms that have been researched, including

- the disappearance of sea ice in the Arctic Ocean
- world-wide retreat of the glaciers, especially the Greenland ice sheet
- the rise in sea level

Since 1979, perennial sea ice in the Arctic Ocean has decreased at a rate of 9% per decade. Dr. Clark showed a movie of a model of this ice sheet from the years 1979-2004. He also showed a movie on

the retreat of the Greenland ice sheet and photos taken by deceased GSOC member Ruth Keene showing smaller mountain glacial retreat on Collier glacier. He showed some graphics of the Larsen Ice Shelf breaking up in Antarctica, with a warning that such structures support the Antarctic continental ice sheet, and when they are gone, the sheet may begin to quickly flow into the ocean, triggering extremely rapid climate change and sea level change.

A “paleo-perspective” on sea level changes was presented next. Twenty-two thousand years ago, at the height of the last glacial epoch, the ocean level was 120 m below that today. Not only that, but in a very short time span of less than 500 years, the ocean level rose between 20 and 25 m during the end of the ice age 15,000 years ago. This data demonstrates not only the wide ranges of sea level possible due to climate, but also the rapidity with which levels can change during a critical warming period.

A major program that has given much data to paleoclimatologists has been the ice core drilling in Greenland, at the GISP2 installation and other similar sites. The GISP2 core is 3000 m deep, and the older layers are over 100,000 years in age. The gases trapped in the ice give valuable information about the abundance of greenhouse gases in the air, the abundance of gas isotopes in the air, and other such climatic information. Temperature for the last 70,000 years was obtained from this record by studying the O18/O16 oxygen isotope ratio for the ice core samples.

One major concern in the global climate change scenario is the thermohaline circulation of ocean water around the globe and the possible cooling of the Northern Hemisphere as a result of the interruption of this cycle. Heavy saltwater located in the northern Atlantic Ocean sinks and travels at depth to the Antarctic and into the Pacific Ocean. The current then rises, warms, and travels around the globe, ending in the Gulf Stream to the North Atlantic. Europeans are particularly concerned about the possible interruption of the Gulf Stream, because it presently warms their climate considerably. With the melting of the Greenland ice sheet, enough fresh water will be dumped into

the North Atlantic to at least slow down this natural “conveyor belt”. On the brighter side, this phenomenon may actually create a negative feedback loop, putting the brakes on further melting of ice in the Northern Hemisphere.

By the end of this century, Dr. Clark told the group that CO₂ levels are expected to be at 500-900 ppm. Sea ice in the Arctic Ocean will also have disappeared. The melting of sea ice and ice sheets in both Greenland and the Antarctic will contribute to the rise in sea level. Since 25% of the US population lives within 10 m of sea level, this rise in sea level will have an impact on a large segment of the population. The magnitude of the problem will depend on the rate of change of these phenomena. Scientists are trying to determine these as well as possible, but this is a process that cannot easily or quickly be reversed.

Carol S. Hasenberg

Additional Reading

Climate Change Websites:

NOAA Paleoclimatology Website – GISP2 project and lots more!

<http://wdc.cricyt.edu.ar/paleo/paleo.html>

EPA Global Warming Kids Site

www.epa.gov/globalwarming/kids/

The Environmental Literacy Council:

www.enviroliteracy.org/

Greenhouse Gases article:

www.enviroliteracy.org/article.php/428.html

Science at NASA: “A Chilling Possibility”

By disturbing a massive ocean current, melting Arctic sea ice might trigger colder weather in Europe and North America.

http://science.nasa.gov/headlines/y2004/05mar_arctic.htm

NASA Goddard Space Flight Center, Global Change Master Directory

<http://gcmd.nasa.gov/index.html>

RAPID: The Natural Environment Research Council (NERC) directed programme for rapid climate change research

Article “The Atlantic heat conveyor”, describing thermohaline circulation

http://www.noc.soton.ac.uk/rapid/sis/atlantic_conveyor.php

From Wikipedia, the free encyclopedia:

“Temperature record of the past 1000 years,”

http://en.wikipedia.org/wiki/Temperature_record_of_the_past_1000_years

“Global climate model”

http://en.wikipedia.org/wiki/Global_climate_model

“Global warming controversy”

http://en.wikipedia.org/wiki/Global_warming_controversy

Other Reading and Media

Editor’s note: I’ve listened to both these audio programs and I highly recommend them both:

Michael B. McElroy, “The Modern Scholar: Global Warming, Global Threat (Unabridged)”, 2003 Recorded Books, LLC, audio program which is available through audible.com

From the publisher’s summary: “This course will discuss the complex interdependent systems that regulate the environment of Earth. Also, this course offers listeners a comprehensive overview of the essential environmental issues of our time. Some of the issues discussed include: air pollution, acid rain, depletion of the stratospheric ozone, destruction of tropical forests, and impending climate changes. We will learn how greenhouse gases such as carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and industrial chlorofluorocarbons (CFCs) have all played a significant role in what is happening to our world. At the end of this course, listeners will better understand the overwhelming impact of industrial pollutants on the planet.”

Elizabeth Kolbert, “Field Notes from a Catastrophe: Man, Nature, and Climate Change (Unabridged)”, 2006 Simon & Schuster, Inc., audio program which is available through audible.com

From the publisher’s summary: “Taking listeners from the melting Alaskan permafrost to storm-torn

New Orleans, acclaimed journalist Elizabeth Kolbert approaches this [Global Warming] monumental problem from every angle. She interviews researchers and environmentalists, explains the science, draws frightening parallels to lost civilizations, and presents the moving tales of people who are watching their worlds disappear. Growing out of an award-winning three-part series for *The New Yorker*, Field Notes from a Catastrophe brings the environment into the consciousness of the American people and asks what, if anything, can be done to save our planet.”

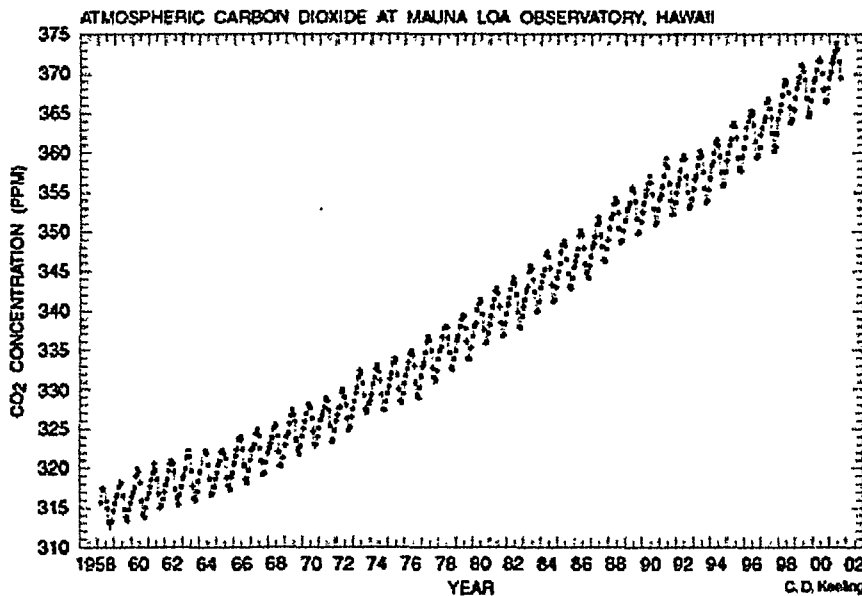
For non-audiophiles the book version is Field Notes from a Catastrophe, by Elizabeth Kolbert, published by Bloomsbury, 192 p., price \$22.95, and is based on a three-part series she published in spring 2005 in the *New Yorker* magazine.

Editor’s note: For the longer range view of earth’s dynamic systems I recommend reading this book:

“The Life and Death of Planet Earth: How the New Science of Astrobiology Charts the Ultimate Fate of Our World: Book Review” article by Carol Hasenberg, *The Geological Newsletter*, April 2005.

Peter D. Ward and Donald Brownlee, The Life and Death of Planet Earth: How the New Science of Astrobiology Charts the Ultimate Fate of Our World, published by Henry Holt and Company, LLC, New York, N.Y., 2002; Owl Books Edition (paperback) published in 2004, 240 pages.

THE KEELING CURVE



“The “Keeling Curve” confirms a steady increase in carbon dioxide levels contributing to the greenhouse effect.”

“Charles David Keeling, noted JIMO researcher, was awarded the National Medal of Science in a White House presentation on 13 June 2002 for his lifetime achievement in scientific research. His significant studies of the carbon cycle and the increase of atmospheric CO₂, have been a pivotal marker in the study of global climate change. Keeling's scientific contributions have affected the

scientific, economic and social challenges which confront us today and well into the future.”

“Keeling was the first to model the accumulation of atmospheric carbon dioxide. The “Keeling Curve” (Figure) encapsulates 45 years of time of series measurements of atmospheric carbon dioxide taken atop Mauna Loa, Hawaii. His data confirmed that the increased accumulation of carbon dioxide produced by burning fossil fuels and other industrial products, contributed to the greenhouse effect. Under Keeling's current JIMO research, which is a continuum of his lifetime study of the global carbon cycle, he is developing measurement techniques in analyzing Ar/N₂ ratios.”

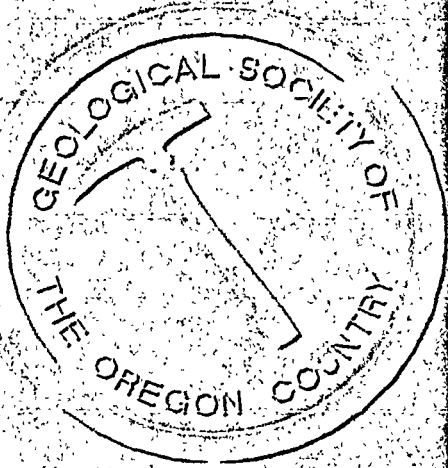
From “National Medal of Science awarded to JIMO researcher for pioneering work on the effects of CO₂ on global climate change”, an article featured in the National Oceanic and Atmospheric Administration Research website, http://www.oar.noaa.gov/spotlite/archive/spot_jimomedal.html. Refer to the website for the remainder of the article and information on JIMO, the Joint Institute for Marine Observations.

Don't forget that annual **DUES PAYMENTS** are due! Think about all those great member benefits for a mere annual fee of \$20 for an individual and \$30 for a family!

PS – If you joined GSOC in September or later, your 2006 dues are paid, which is a good deal!!!

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VISITORS WELCOME AT ALL MEETINGS
INFORMATION: www.gsoc.org

VOL. 72, NO. 5
MAY, 2006

Bonnie Prange, President, 360-693-8396, bonnie@eco-land.com
Calendar Editor, John Teskey, 503-641-7746, lawlib@Teleport.com

MAY ACTIVITIES

Friday Evening Talk, May 12, 8:00 p.m., Dr. William Orr, Professor Emeritus of Geology, University of Oregon, will speak on "Water Woes: An Environmental History of Oregon's Water". Location: Room S17, Cramer Hall, Portland State University, 1721 SW Broadway – between Montgomery and Mill. (Room S17 is on the sub-basement level of Cramer Hall, directly below the Geology Department's main office). The talk is based on Orr's new book, *Oregon Water* (Tidewater Press), which treats the history of Oregon's water, both surface and subsurface. Orr's concern is that although Oregon has a national reputation for an unlimited supply of water, this precious resource is actually in short supply and degrading in quality

Field trip, May 19-21: Portland State University Central Oregon field trip. Three days, two nights, travel by bus from PSU, camp for two nights at Shelton Wayside at the crest of the Ochoco Mountains. See details elsewhere in GSOC Newsletter. Bring camping gear, clothes, and field gear, and plan to prepare meals with a PSU cooking group. GSOC members are welcome to participate in the trip on a noncredit basis by paying \$65 in the Geology Department office, Cramer Hall 17, by May 16. For additional information call Nancy Eriksson, 503-725-3022, or Mike Cummings, 503-725-3395. Trip consists of an introduction to the geology of the Western Blue Mountains and adjacent areas of central Oregon.

Seminar, Wed. evening, May 17, 8:00 p.m.: Overview of the Geology of Oregon All are welcome! Tara Schoffstall, GSOC Member. Room S-17, Cramer Hall, Portland State University, 1721 SW Broadway – between Montgomery and Mill Street (Room S17 is on the sub-basement level of Cramer Hall, directly below the Geology Department's main office).

PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

For Future Upcoming Events See Over

Field trip, June 18 (Father's Day Sunday): Tentative date. Scott Burns, Terroir Tour #5 (Soils and Wines), one-day bus tour of wine and soils. To be paid for through PSU Geology Department. More information in next month's Newsletter.

Field trip, June 25 (Sunday): Bull Run Watershed—Geology, Hydrology, and Engineering. One-day bus tour, cost \$27 (members), \$32 (nonmembers). Limited to 29 participants, first-come, first-serve basis. Reserve a space by mailing check payable to GSOC to: Geological Society of the Oregon Country, PO Box 907, Portland, OR 97207. Include name, address, telephone number, and email address. See details elsewhere in Newsletter. For further information, contact Clay Kelleher, phone 503-775-6263, email clayr2236kher@comcast.net.

August 13 (Sunday): Annual Picnic at Mount Tabor Park. Mark the date in your calendar and plan to bring children, grandchildren, etc. Watch future Newsletters for more information.

September 8-11 (and maybe an additional optional trip following): President's Annual Trip—This year to the Klamath Basin. Mark these dates in your calendar and watch for more information in upcoming Newsletters.

**CHECK THE GSOC WEB PAGE FOR THE LATEST GSOC CALENDAR OF EVENTS,
WWW.GSOC.ORG, OR CALL JOHN TESKEY 503 641 7746**

**Calendar items must be received by 15th of preceding month.
Call John Teskey, 503-641-7746 Lawlib@Teleport.com**

BOARD MEETING NOTES

April 15, 2006

GSOC members present at the meeting included Bonnie Prange, Richard Bartels, Beverly Vogt, Marvel Gillespie, John Teskey, Janet Rasmussen, Larry Purchase, Rosemary Kenney, Tara Schoffstall, Clay Kelleher, and Charles Carter.

The agenda was approved. The minutes of the January 28, 2006, board meeting and the February 10, 2006, Annual Meeting were approved.

Vice President Richard Bartels discussed upcoming speakers: May 12, Dr. William Orr, "Water Woes" (based on his new book); June 9, Marshall Gannett, "Hydrology of the Klamath Basin"; and July 14, Jim O'Conner, "Bridge of the Gods Landslide". Possible future topics include "Pluvial Lakes Alvord and Coyote" (Jim O'Conner), the "Newell Creek Landslide" (Scott Burns), and someone on "Baja British Columbia". Policy of payment for speakers was reviewed.

Tara Schoffstall discussed the Wed. night programs. May 17 she will present "Overview of Oregon Geology", always a popular topic. Another suggested topic could be "How to Take Rock Photographs and Enhance Them with PhotoShop" (Gary Hilton, a GSOC member). Email or phone any other ideas you have to Tara.

Bev Vogt presented the 2006 field trip schedule, including May 19-21, PSU camping trip to central Oregon; June 18, PSU Scott Burns' Terroir Tour 5 (wines and soils); June 25, GSOC tour of Bull Run Watershed; July 29, fossil collecting on the Oregon Coast with Guy DiTorrice, the Fossil Guy; August 19, trip to Ape Caves and surrounding volcanic features with Ken Cameron; and President's Field Trip on September 8-11, plus more optional trips afterwards. Bev will discuss the possibility in cut in Guy DiTorrice's fee for this year or maybe in future years. Bev is to ask Ken if he wants to set a minimum age for participants in his Ape Caves tour. We will have to get a list of motels in Klamath Falls and let people make their own reservations for

the President's Trip. Tara made a suggestion to have more inexpensive trips where we may attract new members. Janet Rasmussen announced her family has three cabins in the Elkhorn Mountains where we could stay sometime in 2007 and possibly use that as a base for the GSOC President's Trip next year.

John Teskey announced that the Annual Picnic will be held August 13, at Mount Tabor Picnic Area A from 8 a.m. to 2 p.m. The rental for the area is \$80, and cost for picnic attendees will have to be determined. Tara will do the children's craft event she had last year at Christmas time.

John Teskey discussed the GSOC library move. John is breaking down the old steel shelves we owned in the downstairs library and will later sell them.

New business: Bev, Bart, and Rosemary volunteered to attend the Annual Scholarship Reception on April 20, and Bev or Bart will make the reservations.

Next board meeting is scheduled for 10:00, June 10, at Rosemary Kenney's house.

Respectfully submitted,
Beverly Vogt, Secretary

DETAILS ON UPCOMING GSOC EVENTS

GSOC trip to Bull Run Watershed set for June 25, 2006 (Sunday)

Focus of trip: Geology, hydrology, and engineering of the Bull Run Watershed

Departure/return point: Parking lot section A-8 of Fred Meyer "Hollywood West" store 3030 NE Weidler St. Fred Meyer allows all-day parking for people taking this trip. Tri-Met has Sunday service on lines #10 and #77 along Broadway, and #9 six blocks away on 24th Ave.

Times: Check-in Sunday, 8:15-9:00; leave 9:00 am, return 5:00 pm.

Cost: GSOC members \$27, non-members \$32, paid in advance (see below).

Transportation: Raz Transportation mini-coach, limited to 29 passengers, no standees, no private autos.

Leaders: Briggly Thomas, Portland Water Bureau Natural Resources Educator/Field Biologist; Jeff Leighton, Portland Water Bureau Hydrologist/Engineer; Beverly Vogt, GSOC member (geology MS thesis in watershed), Clay Kelleher, GSOC administrative leader.

Itinerary: Introductions, field trip guide, and lecture en route. Enter watershed from east gate (Lolo Pass) and proceed westward, stops to be determined at points of interest for geology, hydrology, and watershed management. All stops at or near roadside.

Breaks: Periodic rest stops, and bus has a rest room.

Lunch break: In watershed, bring your own sack lunches and beverages, ice chests provided.

Weather: Watch forecasts and dress appropriately. Even fair afternoons may begin in the Cascades with a morning chill. If rain is predicted in Portland, expect even heavier in the watershed. That's why it's there!

Registration: Mail checks to GSOC, PO Box 907, Portland, OR 97207-0907. Include name and address, and telephone(s) and/or e-mail addresses in case we need to contact you. Make checks payable to GSOC. Space limited, first-come, first-served basis! Full payment required to hold reservation. A waiting list will be built in the order received, fully refunded if we can't fit you in.

Information: Clay Kelleher, e-mail clayr2236kher@comcast.net, or home evenings and weekends phone 503-775-6263.

Cancellations: Trip will occur regardless of weather. You may contact Clay to cancel your reservation as late as Saturday, June 24, at 6:00 pm,

and get full refund. People on waiting list will be notified in order of check received.

GSOC field trip schedule for 2006 announced

May 19-21: PSU Central Oregon field trip. Three days, two nights, travel by bus from PSU, camp for two nights at Shelton Wayside at the crest of the Ochoco Mountains. Bring camping gear, clothes, and field gear, and plan to prepare meals with a PSU cooking group. GSOC members are welcome to participate in the trip on a noncredit basis by paying \$65 in the Geology Department office, Cramer Hall 17, by May 16. For additional information call Nancy Eriksson, 503-725-3022, or Mike Cummings, 503-725-3395. Trip consists of an introduction to the geology of the Western Blue Mountains and adjacent areas of central Oregon. Focus of the trip will be integration of field data concerning rock types, paleontology, stratigraphy, folding and faulting to interpret paleoclimate, regional geologic patterns, and landscape evolution.

June 18 (Tentative date): Scott Burns' one-day bus tour of wine and soils (Terroir Tour #5). To be paid for through PSU Geology Department. More information in next month's Newsletter.

June 25: Bull Run Watershed—Geology, Hydrology, and Engineering. One-day bus tour, cost \$27 (members), \$32 (nonmembers). Limited to 29 participants, first-come, first-serve basis. Reserve a space by mailing check payable to GSOC to: Geological Society of the Oregon Country, PO Box 907, Portland, OR 97207. Include name, telephone number, and email address in case we need to contact you. Bring sack lunch and beverages (ice chests provided), and dress appropriately for the weather. For further information, contact Clay Kelleher, phone 503-775-6263, email clayr2236kher@comcast.net. See additional information about this trip elsewhere in this month's Newsletter.

July 29: Fossil Collecting on the Oregon Coast, in the Newport area. Trip to be led by Guy DiTorrice, the Fossil Guy. We will meet at the first stop near Newport and spend several hours with Guy, collecting fossils, having them identified, and

wrapping them for safe transportation back home. All materials will be provided by Guy. Bring lunches, wear sensible clothing for collecting on the beach. Cost of the trip will be \$19, and reservation and payment will have to be received by GSOC by July 19. Watch for more details in upcoming Newsletters.

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September 8-11: tentative dates, with possible additional time before and after these days. President's Trip to Klamath Basin and surrounding areas, to be led by Margie Jenks, Oregon Department of Geology and Mineral Industries. Watch for more information in upcoming Newsletters.

Dr. William Orr to present May 12 talk to GSOC

On May 12, 8:00 p.m., in Room S17, Cramer Hall, Dr. William Orr, Emeritus Professor of Paleontology of the University of Oregon, and author or co-author of numerous books on the geology of the Pacific Northwest, will present a Friday night talk entitled "Water Woes: An Environmental History of Oregon's Water."

This talk will be based on the Orr's new book, Oregon Water, published recently in Portland by Inkwater Press. In their new book, Liz and Bill Orr have departed a little from their more usual subjects of Pacific Northwest paleontology and geology. Ten chapters and about 300 pages of text with illustrations treat the history of Oregon's water, both surface and subsurface. Despite the image Oregon has nationally of an unlimited resource of water, the fact is that, in Oregon, water is both in short supply and rapidly degrading in quality. Innovations and ideas on how to preserve this precious commodity are as diverse as the state itself.

GEOLOGY AND LANDSLIDE HAZARDS OF SPITSBERGEN ISLAND AND THE NORWEGIAN COAST

Synopsis of talk given April 14, 2006, by Dr. Scott Burns to GSOC

Spitsbergen Island, at approximately 77° north latitude, is a two hour flight north of Tromso, a city on the northerly coast of Norway. Dr. Burns traveled to Spitsbergen and the Norway coast recently for an international symposium on landslides.

Spitsbergen is the largest of a group of islands called Svalbard. Although this group of islands is controlled by Norway, there are a number of settlements from different nations here, for scientific purposes and to mine the rich coal seams on the island. The geological formations on the island consist mainly of Devonian, Carboniferous, and Tertiary sediments atop metamorphic basement rocks (see weblink #2). The strata are largely horizontal and undisturbed, making it very easy to determine the location of coal seams on the island.

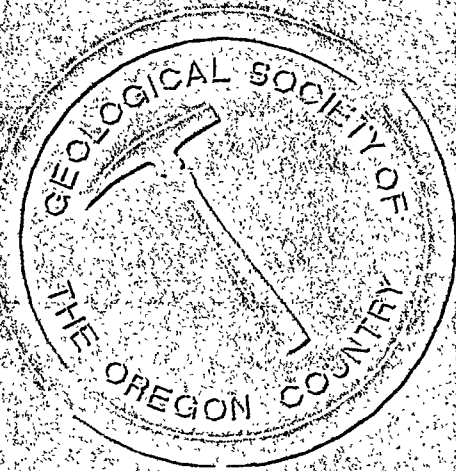
Much of the interior of the island is covered by glaciers and snowfields. U-shaped valleys with steep slopes abound, creating a wealth of opportunities for avalanches and landslides.

Dr. Burns visited the town of Longyearbyen, founded in 1905 by an American coal mining company. The settlement is located in a valley adjacent to the Isfjorden inlet.

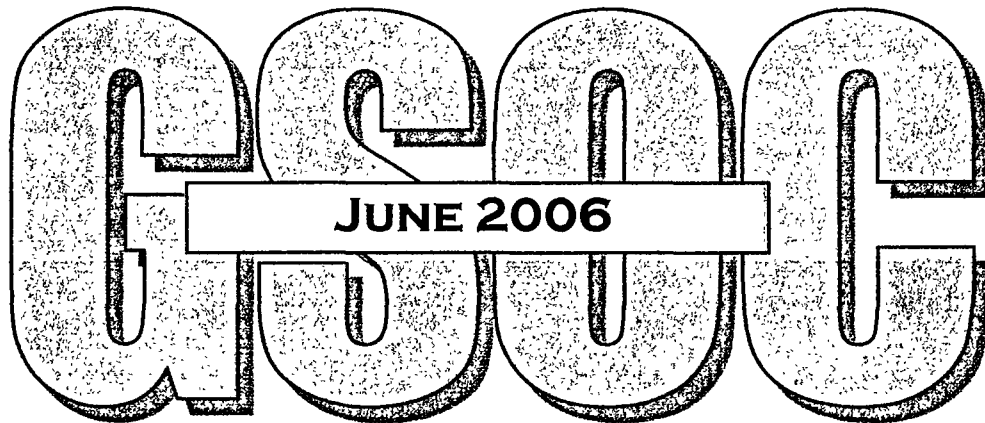
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VOL. 72, NO. 6
JUNE, 2006

Bonnie Prange, President, 360-693-8396, bonnie@eco-land.com
Calendar Editor, John Teskey, 503-641-7746, lawlib@Teleport.com

JUNE ACTIVITIES

Friday Evening Talk, June 9, 8:00 p.m., Marshall Gannett, U.S. Geological Survey Oregon Water Science Center, will speak on "Groundwater Hydrology of the Upper Klamath Basin and Its Relation to Water Supply Issues". Location: Room S17, Cramer Hall, Portland State University, 1721 SW Broadway -- between Montgomery and Mill. (Room S17 is on the sub-basement level of Cramer Hall, directly below the Geology Department's main office.) Gannett will discuss ground-water hydrology, geologic controls on ground-water flow, the relation between ground-water and surface water in the basin, and the response of the ground-water system to recent drought and drought-related pumping. He will also discuss the importance of ground-water hydrology to understanding and resolving water-supply issues in the basin.

Field trip, June 18th: Fifth Annual Terroir Tour: "Geology, Soils, and Wines," led by **Scott Burns, Portland State University Geology Professor**. The one-day bus tour studying the relationship between wine and soils will visit the Stoller, Elk Cove, and Elvenglade Wineries. The bus will leave PSU Geology Department at 10 a.m. and return by 6 p.m. Cost is \$40/person or \$75/couple. Please pay by June 15th. Bring a picnic lunch. To register, call Nancy at 503-725-3022. If you have questions, call Scott Burns, 503-725-3389. See additional information elsewhere in the Newsletter.

Field trip, June 25 (Sunday): Bull Run Watershed—Geology, Hydrology, and Engineering. One day bus tour, cost \$27 (members), \$32 (nonmembers). Limited to 29 participants, first-come, first-serve basis. Reserve a space by mailing check payable to GSOC to: Geological Society of the Oregon Country, PO Box 907, Portland, OR 97207. Include name, address, telephone number, and email address. See details elsewhere in Newsletter. For further information, contact Clay Kelleher, phone 503-775-6263, email clayr2236kher@comcast.net.

PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

For More Future Upcoming Events See Over

Friday Evening Talk, July 14, 8:00 p.m., Dr. Jim O'Connor, U.S. Geological Survey Oregon Water Science Center, will speak on "Bridge of the Gods: Folklore, Forests, and Floods".

August 13 (Sunday): Annual Picnic at Mount Tabor Park. Mark the date in your calendar and plan to bring children, grandchildren, etc. Watch future newsletters for more information.

September 8-11 (and maybe an additional optional trip following): President's Annual Trip—This year to the Klamath Basin. Mark these dates in your calendar and see additional information elsewhere in this newsletter.

**CHECK THE GSOC WEB PAGE FOR THE LATEST GSOC CALENDAR OF EVENTS,
WWW.GSOC.ORG, OR CALL JOHN TESKEY 503 641 7746**

**Calendar items must be received by 15th of preceding month.
Call John Teskey, 503-641-7746 Lawlib@Teleport.com**

DETAILS ON UPCOMING GSOC EVENTS

GSOC trip to Bull Run Watershed set for June 25, 2006 (Sunday)

Focus of trip: Geology, hydrology, and engineering of the Bull Run Watershed

Departure/return point: Parking lot section A-8 of Fred Meyer "Hollywood West" store 3030 NE Weidler St. Fred Meyer allows all-day parking for people taking this trip. Tri-Met has Sunday service on lines #10 and #77 along Broadway, and #9 six blocks away on 24th Ave.

Times: Check-in Sunday, 8:15-9:00; leave 9:00 am, return 5:00 pm.

Cost: GSOC members \$27, non-members \$32, paid in advance (see below).

Transportation: Raz Transportation mini-coach, limited to 29 passengers, no standees, no private autos.

Leaders: Briggie Thomas, Portland Water Bureau Natural Resources Educator/Field Biologist; Jeff Leighton, Portland Water Bureau Hydrologist/Engineer; Beverly Vogt, GSOC member (geology MS thesis in watershed), Clay Kelleher, GSOC administrative leader.

Itinerary: Introductions, field trip guide, and lecture en route. Enter watershed from east gate (Lolo Pass) and proceed westward, stops to be determined at points of interest for geology, hydrology, and watershed management. All stops at or near roadside.

Breaks: Periodic rest stops, and bus has a rest room.

Lunch break: In watershed, bring your own sack lunches and beverages, ice chests provided.

Weather: Watch forecasts and dress appropriately. Even fair afternoons may begin in the Cascades

with a morning chill. If rain is predicted in Portland, expect even heavier in the watershed. That's why it's there!

Registration: Mail checks to GSOC, PO Box 907, Portland, OR 97207-0907. Include name and address, and telephone(s) and/or e-mail addresses in case we need to contact you. Make checks payable to GSOC. Space limited, first-come, first-served basis! Full payment required to hold reservation. A waiting list will be built in the order received, fully refunded if we can't fit you in.

Information: Clay Kelleher, e-mail clayr2236kher@comcast.net, or home evenings and weekends phone 503-775-6263.

Cancellations: Trip will occur regardless of weather. You may contact Clay to cancel your reservation as late as Saturday, June 24, at 6:00 pm, and get full refund. People on waiting list will be notified in order of check received.

Other GSOC 2006 field trip announcements:

June 18: The Fifth Annual Terroir Tour, "Geology, Soils, and Wine", will be held on June 18, 2006, and will be led by Professor Scott Burns, Portland State University Geology Professor. The trip will be by bus, will leave PSU at 10 a.m., and will return by 6 p.m. Parking is free on Sunday in Parking Garage 2 across from Cramer Hall. Stops are as follows:

1. **Stoller Winery**, between Dundee and Dayton. It is owned by Bill Stoller, a PSU alum. He has previously made his wine at Chehalem Winery. His pinot noir, chardonnay, and pinot gris are superb. His soil is Jory because the bedrock is Columbia River Basalt. The winery is very new and is LEED certified!
2. **Elk Cove Winery, Gaston.** This is one of the highest vineyards in elevation in Oregon. The soil is Willakenzie, and the parent material is marine sediments. The Campbells started this winery in 1974 and now have over 100 acres in vines. They specialize in pinot noir, pinot gris, and reisling, and also have the ultimate dessert

wine, "Utima." There are breath-taking views from the tasting room.

3. **Elvenglade Winery, Gaston.** This winery is situated on Willakenzie Soil (marine sediments) and Laurelwood Soil (Columbia River Basalt with loess components). The soils show great pisolitic structure! Bill Kelley is the winemaker and owner. His pinot blanc (probably the best in the state!) won a gold medal at the State Fair two years ago, and his pinot gris has won numerous silver medals. His pinot noir is really good. He also has a dessert wine. His wines are very reasonable in cost.

Cost of the tour is \$40/person or \$75/couple. Bring a picnic lunch. Call Nancy at 503-725-3022 (nancye@pdx.edu) to reserve a spot. Questions should be addressed to Scott Burns, 503-725-3389. After expenses (bus), all money raised goes for the Marvin Beeson Undergraduate Research Award Endowment. Please pay by June 15th.

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GSOC HISTORY SERIES

Dear GSOC Members,

Here's a very old GSOC article which describes the Bull Run municipal water system from it's early days. Those of you going on the Bull Run tour on June 25 can compare this information to what you see today.

Carol Hasenberg

PORTLAND'S MUNICIPALLY OWNED WATER SYSTEM

by Ben S. Morrow

Reprint from *The Geological Newsletter* v.4, no. 12.

The water supply for the City of Portland is obtained from the Bull Run River, the point of diversion being thirty miles east of the City. The entire watershed of the River above the diversion is located within the Bull Run Division of the Mt. Hood National Forest.

This area of 218 sq. miles was set apart as a public reservation by proclamation of President Harrison

in 1892 and in 1904 Congress passed an Act to protect the Reserve from trespass or stock grazing.

The watershed of the Bull Run River lies on the western slope of the Cascades" above the diversion it has an area of 102 sq. miles, lying between elevations 750 and 4700 [feet]. This part of the Cascade Range is composed of volcanic rock in four formations, the lower a basaltic lava, composed of a series of many heavy flows: next above a fragmentary volcanic rock of hard, bouldery agglomerate, cemented gravel, sandstone and ash. Overlying this a series of andesitic lava flows, and at the top gravels and boulders, glacial materials, soils and cemented gravel.

About 80% of the Reserve area is in first-growth timber, mainly fir with some hemlock, cedar, and larch. About 15% has burned over in times past and on most of these burns a substantial second growth has developed. It is estimated that there is over a total of four billion board feet of timber in the Reserve.

Contrary to an old popular belief none of the water of the Bull Run river comes from the glaciers of Mt. Hood, the deep canyons of the West Fork of Hood River and the Sandy River lying between the Bull Run watershed and the mountain. The waters of the Bull Run River come from innumerable springs, small creeks and lakes fed by melting snow and rainfall which is very heavy on the western slopes of the Cascades.

The main branch of the River has its source in Bull Run Lake which lies close to the summit of the Cascades, about seven miles northwest of Mt. Hood at elevation 3175. This lake is one and three-quarters miles long and three-quarters of a mile wide and has a storage capacity of approximately 3 billion gallons. The lake is supplied entirely by springs fed by snow and rain on the slopes surrounding it. The lake has no surface outlet. Instead the outflow goes under an immense mass of shattered basalt and appears in a series of large springs about a mile down the canyon, at an elevation 175 feet below the surface of the lake.

The average flow of record of the River at the Headworks is 812 cu. ft. per second, with a maximum flood of 21,000 cu. ft. per second, and a low flow in late summer of 64 cu. ft. per second. The peak demand on the water supply at the rate of 105 cu. ft. per second occurs during the summer season when the natural flow is approaching the minimum. Storage to meet this demand was necessary. The first development of three billion gallons was made at Bull Run Lake. In 1927 it was necessary to increase the amount of storage and the Bull Run Storage project was constructed on the Bull Run River at a point five miles above the Headworks. A concrete gravity dam 200 ft. in height and 950 ft. in crest length was completed in 1929 at a cost of approximately \$3,000,000. This project provides an additional storage of eleven billion gallons, and the storage reservoir extends 3.5 miles along the river.

The Headworks is located five miles down the river from the storage dam. At this point a gravity dam 40 ft. in height diverts the water into three steel conduits: (42", 52" and 58" diameter) which carries it 24 miles to Reservoirs Nos. 1 and 5 on Mt. Tabor at elevation 411.6. The three conduits have a combined capacity of 149 million gallons per day.

There are four distribution reservoirs located on Mt. Tabor and two in Washington Park. The combined storage capacity within the city is 192 million gallons. The supply for the West Side is carried across ; the Willamette River in two submerged pipe lines, 24" and 30" diameter, laid in trenches dredged in the bottom of the river, and in two 24" diameter lines located on the Ross Island bridge.

The distribution system of the City, supplying an area of 66 sq. miles, comprises over 1,200 miles of mains; 6644 hydrants are installed for fire protection.

In addition to furnishing the supply for the city proper the Water Bureau also supplies 55 Water Districts and Companies in outside areas adjacent to the city. The total investment in the water system represents an outlay of over \$28,000,000.

The water is of excellent quality for domestic and commercial use. It is very soft and has a Ph value of 7.0. The results of analyses taken at 10-day intervals throughout a year by the U. S. Geological Survey shows the following averages:

<u>Content.....</u>	<u>Parts per million</u>
Total dissolved solids	30
Silica	9
Iron.....	0.03
Calcium.....	2.7
Magnesium	0.5
Sodium.....	3.1
Potassium.....	0.5
Bicarbonate.....	12.0
Sulfate.....	3.1
Chloride.....	1.3
Nitrate.....	0.31
Total Hardness as CaCO ₃	8.8

Ralph C. Clyde
Commissioner of Public Utilities

GEOLOGY AND LANDSLIDE HAZARDS OF SPITSBERGEN ISLAND AND THE NORWEGIAN COAST

Synopsis of talk given April 14, 2006, by Dr. Scott Burns to GSOC

This article was unintentionally shortened in the printing process last month; here it is in its entirety (hopefully).

Spitsbergen Island, at approximately 77° north latitude, is a two hour flight north of Tromso, a city on the northerly coast of Norway. Dr. Burns traveled to Spitsbergen and the Norway coast recently for an international symposium on landslides.

Spitsbergen is the largest of a group of islands called Svalbard. Although this group of islands is controlled by Norway, there are a number of settlements from different nations here, for scientific purposes and to mine the rich coal seams

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The town huddles between steep treacherous slopes and a braided stream plain which floods every year with glacial meltwater. By careful building location and the construction of diversion berms, residents can protect themselves from most of the slide events. The buildings are built on stilts above the permafrost so that the ground will stay frozen and not settle. Pipes and wiring are well insulated. Building supplies must be imported from the mainland only in the summer, so planning is careful and nothing is wasted.

The buildings in Longyearbyen are brightly painted and cheerful in appearance. This helps to offset the effects of the stark terrain and the four months of darkness experienced in the winter. Above Longyearbyen are entrance buildings for old mines which have been abandoned. These mines are now filled with ice from water which has dripped into the voids.

Despite the harsh environment, or maybe because of it, Spitsbergen is a mecca for Arctic science. A school with 400 students is located on the island which teaches Arctic design, Arctic biology, etc. Paleozoic fossils of ammonites, early bivalves, and trilobites (from Richard Fortey's book Trilobite: Eyewitness to Evolution) are to be found on the island. Arctic expeditions often are launched from this island.

Dr. Burns also visited the community of Barentsburg, another coal mining community just down the coast from Longyearbyen. This is a Russian town which is much less inviting in its architecture than Longyearbyen. The Stalinesque apartment blocks are built directly onto the permafrost, which is melting and the resulting settlement is tearing the buildings apart.

After returning to Norway from Spitsbergen, Dr. Burns toured the Norwegian coast and the islands adjacent to the coast in the northern part of the country. The Norwegian coast is rife with landslides, with its high mountains terminating abruptly into the ocean. This phenomenon has been caused as a result of glacial rebound. The landslide hazards here include snow avalanches, debris avalanches, rock falls, and tsunamis produced in the narrow fjords by major landslides. Landslide mitigation methods employed by the Norwegians include tunnel-covered roadways, avalanche berms, and landslide monitoring programs.

Another hazard which Dr. Burns visited in Norway was that caused by "quick clays" in glacial silt. These deposits were originally made in salt water, so when the salt dissolves in the uplifted terrain, voids are left in the soil. This structure is extremely unstable, and small vibrations can instigate soil liquefaction. Houses will float in the liquefied soil and drift long distances.

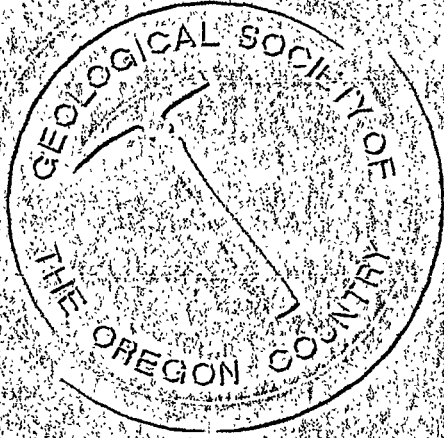
Carol S. Hasenberg

Additional weblinks:

1. Answers.com facts on Svalbard:
<http://www.answers.com/topic/svalbard>
2. Geology of Svalbard from Dr. Harmon D. Maher Jr., Department of Geography and Geology, University of Nebraska at Omaha:
<http://maps.unomaha.edu/Maher/svalbard/introsvalbard.html>
3. Photos and Maps of Spitsbergen:
<http://www.svalbard-images.com/> and
<http://www.geo.uni-bonn.de/members/fabian/nyalesund/nyalesundfotos.htm> (this site behaved poorly in Netscape but was fine in MS Internet Explorer – it contains many fine images of Longyearbyen and Spitsbergen)

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JULY ACTIVITIES

Friday Evening Talk, July 14, 8:00 p.m., Dr. Jim O'Connor, U.S. Geological Survey Oregon Water Science Center, will speak on "Bridge of the Gods: Folklore, Forests, and Floods". Location: Room S17, Cramer Hall, Portland State University, 1721 SW Broadway, -- between Montgomery and Mill. (Room S17 is on the sub-basement level of Cramer Hall, directly below the Geology Department's main office.) Dr. O'Connor's talk will discuss the Bonneville Landslide in the Columbia River Gorge.

Field trip, July 29: Fossil Collecting on the Oregon coast. This trip will be led by Guy DiTorrice, the Fossil Guy. Registrants must fill out the registration form found elsewhere in the Newsletter and mail along with check for \$19 made out to GSOC to: GSOC, PO Box 907, Portland, OR 97207, so it is received by July 19. The trip will be in the Newport area and will include a briefing on Oregon coast geology, Miocene flora and fauna, Oregon public beach rules and regulations, beach safety and land conservation, and fossil collecting tips. All equipment and fossil collection materials will be supplied. Your collected fossils will be identified, bagged and labeled for the trip home. Bring your lunch and dress appropriately for the weather and activity. Carpooling is encouraged. For information about the meeting time and location, contact Richard Bartels, 503-292-6939.

There will be no Wednesday night seminar in July or August.

PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE
PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

Future Upcoming Events (see Newsletter for detailed information on these events)

August 13 (Sunday) 10 a.m. to 2 p.m.: Annual Picnic, and Crafts for Geology at Mount Tabor Park. Mark the date in your calendar and plan to bring children and grandchildren.

August 19 (Saturday): Field Trip to Ape Caves and Surrounding Volcanic Features: led by Ken Cameron, Oregon Department of Environmental Quality.

September 8-10 (Friday through Sunday): President's Annual Field Trip—this year to the Klamath Basin. Optional extra trip September 11 and 12 to Lava Beds National Monument and Medicine Lake Volcano in northern California.

DETAILS ON UPCOMING GSOC EVENTS

Coastal fossil field trip set for July 29

Guy DiTorrice, the "Oregon Fossil Guy," will lead us on a 2-1/2 hour fossil hunting trip on Saturday, July 29, near Newport on the central Oregon coast. We will go individually by car to the coast and meet Guy at the designated meeting place at 10:30 a.m. Guy has led many fossil collecting trips on the Oregon coast and was featured in an article in the September 2004 *Coastal Living*. He will provide all equipment and fossil collection material, a copy of the Sea Grant fact sheet "Fossils You Can Find on Oregon Beaches", and a copy of Oregon beach fossil collecting rules and regulations.

Guy will brief us on Oregon coast geology, Miocene flora and fauna, Oregon public beach rules and regulations, beach safety and land conservation, and fossil collecting tips. He will provide all needed collecting equipment (gloves, magnifying glasses, brushes, fossil fliers, bags and labels). He will also bag and label your collected fossils for your trip home. This should be fun for all the members of the family. Guy recommends that everyone wear jackets for layering and footwear that is sturdy enough for walking on loose cobbles and unsteady ground. Also bring a lunch and drinking water.

Cost of this trip is \$19 and must be paid in advance. To participate, fill out the form at the end of the newsletter (one for each person) and send it and a check for \$19/person made out to GSOC by July 19 to: GSOC, PO Box 907, Portland, OR 97207. The check must be received by July 19. If you have any questions or are able to take passengers or want to carpool, call Richard Bartels, 503-292-6939. Guy also has a website: www.oregonfossilguy.com.

Annual GSOC Picnic

Sunday, August 13, 2006, 10a.m. to 2 p.m.

Location: Mount Tabor Park Picnic Area A. Enter the park either on Belmont at SE 69th Ave. or on SE

60th at Salmon St. Follow the signs to the amphitheater. Picnic Area A is across the road from the amphitheater and crater.

Special treat: Tara Schoffstall will have a crafts session beginning at 10 a.m. for any children (or adults) who want to make something interesting, beautiful, or useful out of geologic materials (rocks mostly). Plan for an unusual activity that will be lots of fun!

Food: GSOC will provide plates, eating utensils, and paper cups, as well as hamburgers, turkey burgers, veggie burgers, and hot dogs, plus the buns and condiments. If your last name begins with A through L, bring a salad or side dish, and if M through Z, bring a dessert. Please bring your own drinks: alcohol is approved for beer and wine under the conditions of our permit. Lunch begins at noon.

RSVP: Please phone Marvel Gillespie (503-246-2368) and indicate number who will be coming, type of food you will bring, and your choice of burger(s) or hot dogs.

August field trip to Ape Cave and surroundings announced

On Saturday, August 19, Ken Cameron, popular GSOC field trip leader, will take us on a trip to Ape Caves and surrounding volcanic features. Ape Caves is one of the best known lava tubes in the area. We will meet in Cougar WA at 10 a.m. and caravan to the cave. The route is about 65 miles: take I-5 to the Woodland exit #21 (about 35 miles) and then on Highway 503 along the Lewis to Cougar (about 28 miles). Allow plenty of driving time. The meeting place will be announced in the next month's Newsletter. Bring your lunch and water and dress appropriately.

We will first go to the cave. Everyone must have his/her own working flashlight and spare batteries. The cave is ¼ mile from the parking lot and is ¾ miles to the end, so the whole round trip is about 2 miles. It is generally cool inside, around 40 or 45 degrees, and water drips from the ceiling in a few places. The ground is soil rock and slightly rough, but nothing has to be climbed over. There are about

40 metal stairs leading into the cave from the opening.

After the cave, we will go to the Trail of Two Forests to see other volcanic features and eat lunch. The field trip should be over around 2 or 3 p.m., plus the trip back to Portland.

Cost of the trip will be \$5 members and \$7 for nonmembers, plus the Forest Pass which is \$5/day (available at Ape Caves), or if you already have one for the year, you don't have to pay more. Carpooling is encouraged. If you have questions about the trip or can either take passengers or need a ride, call Rosemary Kenney, 503-892-6514.

GSOC HISTORY SERIES

Dear GSOC Members,

Here's an old GSOC article which describes the creation of Mt. Tabor Park. We're looking forward to the picnic there in August!

Carol Hasenberg

HOW MT TABOR'S CINDER CONE WAS SAVED FOR POSTERITY

by CHARLES PAUL KEYSER

Member, American Society of Civil Engineers, Past President American Institute of Park Executives and sometime Superintendent of Parks and Public Recreation in Portland, Oregon
reprinted from the October 1961 and November 1961 Geological Newsletter

For an account of how and when the cinder cone in Mt. Tabor Park was discovered, or perhaps I should say uncovered, I will endeavor to give you the story as I recall the incidents, -as suggested by you when I was a guest at your annual picnic August 11th.

On March 17, 1909 I entered the service of the Municipal Board of Park Commissioners. was appointed to the position of Executive Head of the Bureau in August, 1917, and continued in that capacity until retirement December 31, 1949. My initial appointment was classified as Civil Engineer in the Department of Parks. When in 1913 a sweeping City Charter revision abolished the Park Commission and set up the Commission form of government organized in five administrative Departments, our unit still self contained, was allocated to the Department of Public Affairs, and officially ever since has been designated the Bureau. In either case the Superintendent was the administrative head, conforming to policy set by the tax-levying City Council in the annual budgets, in the main.

My position when I entered the service in 1909 had been newly created. Theretofore E. T. Mische, who had been appointed Superintendent a year previously, had been getting along without a much needed principal assistant, and I was expected to be the right kind of help in working out his expansion and development schemes. Besides ordering engineering and architectural works and their operation in the park system, pretty much delegated to the Engineer, while the Superintendent managed and supervised the various phases of planting including gardening and propagation. we prosecuted an extensive schedule of land acquisition. Our main source of appropriation was a one million dollar bond issue that Mische had to start with in 1908. We did right well for five years, and then went back to the people for money but did not get it. In the Spring of 1913, in the same election in which the Park Commission was abolished, Mische's two million dollar bond measure failed to pass. which for him was a handwriting on the wall He failed to click with the new regime, struggled along bravely for a couple of years longer, and in 1915 stepped down and was succeeded by J. O. Convill who had been appointed by City Commissioner Wm. L. Brewster as Assistant Superintendent in charge of maintenance and operation.

Convill had been a notable college athlete. His extensive background in sports and savvy of publicity made him especially useful to Brewster

who was rather inclined to promoting recreational activities with such appropriations as he could wangle, until the time would be right to plug for more bond or other capital expenditure. I continued on as second fiddle to the Superintendent until World War I broke. Convill enlisted. I volunteered, was rejected and did my bit to keep the home fires burning for the duration. Mische had already left and was doing cantonment work for the Navy. When Convill was mustered out he engaged in other pursuits and I was in the saddle permanently. And so it would appear that I should be responsible principally for what has taken place in Mt. Tabor Park since the City came into possession, with due credit to Mische for designing the development.

Mt. Tabor is a natural for a public park. It is said to have been named by Clinton Kelly, a notable pioneer preacher, after the Mt. Tabor in Palestine. The historic mountain near the Sea of Galilee, twelve hundred feet higher is more of a mountain, but Kelly's Mt. Tabor standing at altitude 643, commanded a view of waters, woods and lofty mountains not to be despised, besides containing a volcano that Kelly knew not of in his lifetime. In 1909 most of the high ground was still in more or less neglected ownerships following a real estate bust of the nineties. Money would buy it at moderate prices. Fifteen years earlier the Bull Run water supply had been brought to Reservoir No.1 which is niched into the south face of the mountain with an overflow level of 412. Now the Board of Water Commissioners was getting ready to construct two additional main reservoirs, and between Waterworks and Park acquisitions the city engaged on a program to round out 200 acres all told.

Mische wrought well to corral the 200 acres for park purposes at the opportune moment, and although it took a major fraction of his first million no one will question that it was money very well spent. In my opinion, making Mt. Tabor a most outstanding feature of our park system was his greatest single achievement, even if he was disappointed in failing to acquire the property fronting on S. E. 60th Avenue between Reservoirs #6 and #2, and a more ample margin on the eastern slope.

On the west slope are a pair of mounds standing like shoulders with a breastbone ridge between. They are about equal in altitude, standing a hundred feet or so lower than the crest of the mountain, Reservoir No.5 was nestled into the hollow between the south mound and the ridge, and has the same overflow level as No. 1. Between the north mound and the ridge is a deeper hollow or little valley running down to S. E. Salmon St. For convenience in our discussion we might designate the left shoulder Mound Satsop. and the right shoulder Mound Cinder-Ella, noting that they differ radically in composition. We are here concerned mainly with Mound Cinder-Ella which is our extinct volcano in question.

Perhaps this is as good a place as any to mention a hoax that was perpetrated in connection with the find. A park employee salted a sample of the cinders with some rich ore from Telluride, Colorado which he beat up and had assayed. When the assay showed nearly \$1,100 to the ton it caused considerable excitement --almost a gold rush! Further digging exposed cinders and scoria in the toe of the slope of the east base of Mound Cinderella. This led to prospecting the whole mound which revealed that the extra-ordinary formation was completely concealed under a blanket of fine grained soil in places no more than three feet in thickness.

We continued our excavations over the following several years until we had truncated the east half of the cinder cone leaving it standing with a vertical resection cut through the heart of the vent. and in the space from which the cinders and clinkers had been borrowed for use in constructing footpaths and rock walls in the various parks. an open air theatre with a subjoined picnic space was constructed.

Before we stopped the mining operation Ira A. Williams of the Oregon Bureau of Mines and Geology was called in to give a geologist's report and recommendation. Our excavations and test borings had disclosed Cinder-Ella's secrets, except we had not probed deeply enough to tell exactly her connection with a parent volcano that Williams believed had been overlaid by the mass of Satsop

that forms the main mass of the upper hundred feet or more of the mountain. It is conceivable that means might have been found to verify his theoretical conclusion by probing with shaft and tunnels that he had in mind, if death had not brought an untimely end to his career. I should have been a hound like early-day California's Sutro who persisted and prevailed in his famous tunnel project to tap the Comstock. Hope still flickers that some scientific or civic influence will get this done.

At this time the unkind Superintendent of Parks was dogged and harried by landscape gardeners, homemakers and others who coveted the treasures of Cinder-Ella. When Portland became a great ship building city in the time of World War I, it was proposed to utilize the cinders as a light-weight aggregate for concrete hulls. Then there were those who muttered, not understanding how the taxpayers could be denied while minions of government were using the precious material prodigally in fixing up the Public's parks. There were conscientious objectors who deplored the desecration along with the scientific minded who feared we were going too far with our excavations. In the end this Horatio managed to escape with his hide and reputation for resistance.

However, it must be remembered that the Geological Society of the Oregon Country came forward when the time was right to protest consistently against any further removal, giving the support that was required to preserve our Cinder-Ella as a unique feature of the Park system of the City of Roses. It matters not at all who happened to be present at the accidental discovery of the "gold mine." Whosoever will unveil the inner secrets of Mt. Tabor's volcanic origin should be entitled to an accolade.

For a better conception of Mt. Tabor, (as well as Rocky Butte, Kelly Butte, and other neighboring buttes), reading of his "The Columbia River Gorge; its Geologic History Interpreted from the Columbia River Highway", published by the Oregon -Bureau of Mines and Geology in 1916 and revised in 1923 is recommended. (Available in our Public Library.)

For story of dedication of cinder cone and placing of bronze tablet. see GSOC News Letter of September, 1952: Inscription reads as follows: "Through the fiery throat of this volcano exploded glowing cinders which, cooling, formed the ground on which you now stand. Younger than the hundreds of volcanoes which poured out their lavas in the foothills of Mt. Hood, this cinder cone has withstood the ravages of time to become a part of Mt. Tabor. It now stands peacefully in the City of Roses, the only major city in the United States that has a volcano within its borders. This tablet was installed by the Geological Society of the Oregon Country August 8, 1952."

(Editor's note to current GSOC readers—the article mentioned above is scheduled to be reprinted in next month's Geological Newsletter)

BITS AND PIECES

Do GSOC members want a slide scanner they can rent?

Clay Kelleher has been investigating the possibility of having GSOC purchase a slide scanner that can be used to convert old slides into digital (.jpeg) format. His suggestion is that GSOC could purchase such a scanner and pay for it by charging GSOC members an as-yet undetermined rental fee for using it. The scanner would have to be plugged into your own computer, so to use it, you would have to have a computer and know how to plug the scanner into your own system. He wants to know how many GSOC members would be interested in renting such a system from GSOC. If you are interested, either call Clay at home (503-775-6263) or contact him by email (clayr2236kher@comcast.net).

GSOC library moves to new location

Thanks to the hard work of John Teskey and PSU students, the GSOC library has been moved from its old, dark, subbasement location upstairs to the Terry Jones Memorial Room just opposite the Geology Department office. John moved most of the library books and moved and sold the old steel shelves for GSOC. Without his hard labor,

knowledge of books, and persistence, this move could not have been accomplished. New shelves were purchased, and GSOC members will enjoy the new, much more attractive setting.

Motels, RV Park, and Campground for the President's Field Trip to Klamath Falls

Here are some suggestions for motels, campground, or RV accommodations in Klamath Falls. Field trip participants are expected to make their own arrangements for lodging and meals.

- Quality Inn (closest to Co. Courthouse and Friday night lecture): 1-541-882-4666
- Maverick (less expensive -- about 10 blocks from Courthouse): 1-541-882-6688
- Holiday Inn Express (5-minute drive): 1-541-884-9999
- Best Western Olympic Inn (5-minute drive): 1-541-882-9665
- Oregon Motel 8: 1-541-883-3431
- Motel 6: 1-541-884-2110
- Klamath Falls KOA: 1-541-884-4644
- Oregon 8 RV Park 1-541-883-3431

REGISTRATION FORM FOR JULY 29 COASTAL FOSSIL TRIP

Name _____ Phone (____) _____

Address _____ City _____

State/Prov. _____ Zip/Postal Code _____ Date _____

Please sign the following disclosure and sign below:

Participants must be 18 years of age or accompanied by a legal guardian, provide their own transportation to/from field trip point(s) of departure, and provide field trip payment in full before departure. The undersigned recognizes the potential for hazards not under the control of the field trip guide and assumes the risk of any and all loss of, or damage to, property and/or bodily injury, including death, however caused resulting from, arising out of, or in any way connected to this field trip. The undersigned indemnifies and holds harmless the field trip guide from any loss, liability, damage or costs that may be incurred due to acts or omissions of any trip participant. I have read and fully understand the conditions of participating in this field trip. I am aware that this is a legal release of liability and contract between the field trip guide and myself. I sign here of my own free will.

Signature _____ Date _____

Legal Guardian _____ Date _____

**President's Field Trip
Klamath Basin
September 8 through September 10, 2006**

The focus of this year's trip is the geology of the Klamath Basin, southern Oregon, with emphasis on new geologic mapping in Klamath County. The leader will be Margaret (Margi) Jenks, geologist with the Oregon Department of Geology and Mineral Industries, who has been mapping in the Klamath Basin for the last few summers. More details will be in the August Newsletter.

September 8: Leave Portland in the morning in private vehicles. First session will be a presentation in Klamath Falls at 7 p.m. on geology of the area and new geologic mapping. This presentation will be open to the public. Field guide materials will be provided free of charge to all attendees.

September 9: Car caravan going northeast of Klamath Falls with six or seven stops looking at local geology and stratigraphy. This trip is also open to the public.

September 10: Private tour of the area with Margi, who has gotten permission from private landowners to go onto their land to see geologic sites not generally accessible to the public. The trip should last most or all of the day. The President's Trip formally ends on Sunday evening.

September 11: Leave Klamath Falls in the morning. There will also be an optional two-day trip (Sept. 11 and 12) led by Richard Bartels to see Lava Beds National Monument and Medicine Lake Volcano, just across the border in northern California. The only cost of the optional trip will be \$10 for copying of field trip guides, payable to Bart at the beginning of the optional trip. If you are interested in the optional trip, call Richard Bartels, 503-292-6939, for more information.

Cost of the President's Trip and Payment

Cost of the President's Trip (Sept. 8-10) is \$20 for GSOC members and \$25 for nonmembers. Field trip participants are expected to make their own arrangements for transportation, lodging (see list of possible motels in Klamath Falls elsewhere in the Newsletter), pay for their own meals, and pack a lunch and carry water each day. Please make checks out to the "President's Field Trip" and send to the Geological Society of the Oregon Country, P.O. Box 907, Portland, Oregon 97207-0907 by **August 30, 2006**.

Policy for Minors: In order to attend a GSOC field trip, participants under 21 are required to have permission in writing from a parent or other legal guardian. In addition, minors must be accompanied by a parent, guardian, or responsible adult designated by that person.

Name(s) _____

Name(s) _____

Number of registrants _____ Payment enclosed _____

Address _____

Telephone _____ Email _____

For questions contact Bonnie Prange (bonnie@eco-land.com; (days) 360-578-1371)

Important: A waiver/medical form for each participant must accompany this registration form. See next page.

Geological Society of the Oregon County
P.O. Box 907
Portland, Oregon 97207-0907

President's Field Trip to the Klamath Basin

Note: Please fill out a separate waiver form for each participant.

I understand that the Geological Society of the Oregon County field trips may involve inherent risks. I realize that natural hazards do exist, and that falls and collisions do occur, that therefore injuries may result, and therefore accept the risks to myself and others and I agree to use extreme caution at all times on this trip.

I understand that any costs for medical expenses incurred as a result of accidental injury or death while participating in the field trip WILL NOT BE PAID BY THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

I, undersigned, intending to be legally bound, hereby for myself, my heirs, executors, and administrators, waive and release any and all rights and claims for losses and damages I may have against the Geological Society of the Oregon Country, its officers, board members, and field trip leaders, and all other parties and their representatives, successors, and assigns for all and any injuries suffered by me on this field trip. I attest and verify that I am participating at my own risk.

Signed: _____ Dated: _____

Parent or other legal guardian signature: _____

Medical Information

Name _____

Phone number _____; Email _____

Name of physician _____; Phone number _____

Allergies _____

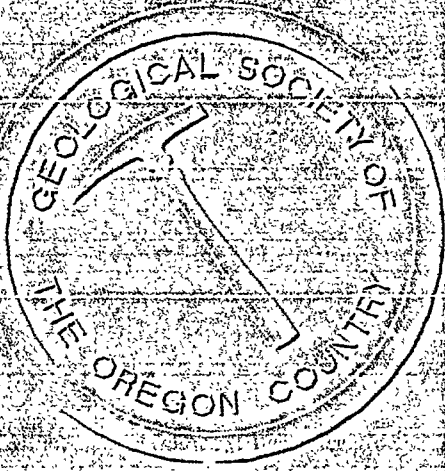
Special medications _____

Special medical conditions _____

In Case of Emergency call _____

**GEOLOGICAL SOCIETY OF
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THE GEOLOGICAL NEWSLETTER

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

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John Teskey – 503/641-7746

Business Manager:

John Teskey – 503/641-7746

Assistant Business Manager:

Rosemary Kenney – 503/892-6514

ACTIVITIES:

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

FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.

GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details

GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.

PROGRAMS: Second Friday evening most months, 8:00 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon.

MEMBERSHIP: Per year from January 1: Individual--\$20.00, Family--\$30.00, Junior (under 18)/Student--\$10.00.

PUBLICATIONS: THE GEOLOGICAL NEWSLETTER (ISSN 0270 5451), published monthly and mailed to each member. Subscriptions available to libraries and organizations at \$15.00 per year. Individual Subscriptions \$13.00 per year. Single Copies: \$1.00. Order from:

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.

WEBSITE: www.gsoc.org. Email address: gsoc@spiritone.com.

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 \$20.00 _____ Family \$30.00 _____ Student \$10.00 _____

Make Check Payable to: The Geological Society of the Oregon Country
PO Box 907
Portland, OR 97207-0907

GEOLOGICAL NEWSLETTER

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

VISITORS WELCOME AT ALL MEETINGS
INFORMATION: www.gsoc.org

VOL. 72, NO. 8
AUGUST, 2006

Bonnie Prange, President, 360-693-8396, bonnie@eco-land.com
Acting Calendar Editor, Beverly Vogt, 503-292-6939, bevvoigt@comcast.net

AUGUST ACTIVITIES

There will be no Friday night lecture because of the Annual Picnic.

August 13 (Sunday) 10 a.m. to 2 p.m.: Annual Picnic, and Crafts for Geology at Mount Tabor Park, Picnic Area A. Enter park either on Belmont at 69th Avenue or on SE 60th at Salmon Street; follow signs to the amphitheater and crater. Picnic Area A is across the road from the amphitheater and crater. GSOC will provide plates, eating utensils, and paper cups, as well as hamburgers, turkey burgers, veggie burgers, and hot dogs, plus the buns and condiments. If your last name begins with A through L, bring a salad or side dish, and if M through Z, bring a dessert. Bring your own drinks. Lunch begins at noon. Tara Schoffstall will also have crafts starting at 10 a.m. for children (or adults) who want to create something out of geologic materials. RSVP to Marvel Gillespie (503-246-2368) and indicate number who will be coming, type of food you will bring, and choice of burger(s) or hot dogs. See more details elsewhere in the Newsletter.

Field trip, July 29: Ape Caves and surroundings: On Saturday, August 19, Ken Cameron will lead a field trip to Ape Caves, one of the best known lava tubes in the area, and surrounding volcanic features. Meet in Cougar WA at 10 a.m. at the store/service station at the east end of town, and we will caravan to the cave. The route to Cougar is about 65 miles: take I-5 to the Woodland exit #21 (about 35 miles) and then on Highway 503 along the Lewis River to Cougar (about 28 miles). Allow plenty of driving time. Bring your lunch and water and dress appropriately. Everyone must have his/her own working flashlight and spare batteries. The cave is ¼ mile from the parking lot and is ¾ miles to the end, so the whole round trip is about 2 miles. After the cave, we will go to the Trail of Two Forests to see other volcanic features and eat lunch. The field trip should be over around 2 or 3 p.m., plus the trip back to Portland. Cost of the trip will be \$5 members and \$7 for nonmembers, plus the Forest Pass which is \$5/day (available at Ape Caves), or if you already have one for the year, you don't have to pay more. Carpooling is encouraged. If you have questions about the trip or can either take passengers or need a ride, call Rosemary Kenney, 503-892-6514. See more details elsewhere in the Newsletter.

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DETAILS ON UPCOMING GSOC EVENTS

Note: See page 38 for details on President's Field Trip

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GSOC HISTORY SERIES

Dear GSOC Members,

Here are the articles dealing with the GSOC plaque installed on Mt. Tabor and the GSOC picnic there that year. I'm looking forward to seeing the plaque and fellow GSOC'ers there this month!

Carol Hasenberg

Article 1: July 1952 Geological Newsletter

GSOC TO DEDICATE PLAQUE

SPECIAL ANNOUNCEMENT: Sometime before August 26, 1952, the Bureau of Parks and

Recreation has agreed to let us dedicate a brass plaque to be placed in the crater of Mt. Tabor Park at one of their evening programs in Volcano Theatre.

We are anxious to hear immediately from our interested membership and especially our geologists giving their ideas of what should appear on this plaque that would be the most informative to the public of Mt. Tabor's history and origin.

Sit down RIGHT NOW - draw up a rough draft of what your ideas are and mail them to our plaque inscription chairman, Mr. F. W. Libbey, State Department of Geology and Mineral Industries, 1069 State office Building, 1400 S.W. 5th Avenue, Portland 1, Oregon, so that it arrives in his hands not later than July 15th.

Article 2: September 1952 Geological Newsletter

ANNUAL PICNIC --MT. TABOR PARK --AUGUST 8, 1952

"Perfect picnicking weather" ushered in our 1952 Annual Picnic at Mt. Tabor Park on the evening of August 8. It was a warm, balmy evening when a goodly number of G.S.O.C. members met for the usual hot "cafeteria style" dinner which proved as usual its great popularity. There was much shuffling of plates and cups and going back for seconds, refills of coffee and finally, a gathering like bees 'round a honey jar for the pies, cakes, and melon at the dessert table.

Following dinner, President Stone called the group together for a long anticipated event, the unveiling of the bronze plaque which is reported elsewhere in this issue.

Then to "Volcano Theatre" which many had seen for the first time since its being rebuilt, for the usual stunts, singing, etc. The Park Department has done itself proud in remaking this theatre area -built from lava rock of the volcano it is artistic, beautiful, and functional. We suspect that Mt. Tabor Park foreman, Mr. Sam Allen, who as usual was on hand to see that everything went smoothly, has had

something to do with the successful rebuilding of the area. Also, we like to think that we Geesockers may have had apart -at least in suggesting the suitability of the area for entertainment purposes, for we've been presenting our stunts, skits, etc., there for many years.

With President Norris Stone emceeing, a lot of "wishing" started among the audience -- accompanied on the piano by Miss Mary Davenport. It was revealing to know that apparently many of our GSOC group have been harboring long-suppressed desires for varied accomplishments such as to be a "fossil by the sea," "an ancient oredon," "a little three-toed horse," and others. In addition to Mary and President Stone, Johanna Simon, Ken Phillips, Lon Hancock, Eddie and May Bush by, and a quartet consisting of Gregg Davis, Gene Hampton, John Wheeler, and Dick Walker sang out lustily just what they "wished they wuz."

Emcee Stone next announced the title of the skit - "Sabotage in the Ochocos." He later corrected it to "Sabbath in the Ochocos," but after seeing the skit, we think he was right the first time.

Mr. Edward Clark as Pete Huckleberry and Glenna Teeters as his wife, Mehitabel, got their roadway paved, even though it caused Trip Leader Bruce Schminky no end of embarrassment. The long line of female members who lined up er a --for photographs by Leo Simon, who carelessly let his sign get blown down (wind erosion), were Mrs. Bruce Schminky, Mary Lou Oberson, Mrs. Edward Clark, Estella Connor, Mrs. Toralf Erickson and daughters Judy and Joan, and Aunt Minnie, played by Mr. James Galt in the absence of the original, Leonard M. Buoy.

Mrs. Albert Keen, general chairman, and her committee and R. F. Wilbur, entertainment chairman, are to be congratulated on a very successful and entertaining evening.

J.E.

(Editor's Note: J.E. is Jane Erickson, the Geological Newsletter Editor at that time.)

Article 3: September 1952 Geological Newsletter

BRONZE PLAQUE INSTALLED ON MT. TABOR

Those of us members who attended the annual picnic at Mt. Tabor Park Friday evening, August 8, witnessed with a great deal of pride the fulfillment of a long-felt wish --the unveiling of a bronze plaque at the crater of Mt. Tabor, a gift of our Society to the people of Portland.

After being called to the area by President Norris Stone, the group heard a short talk by Dr. J. C. Stevens on the geology of the crater and surrounding area. Dr. Stevens then unveiled the plaque which stands at the east end of the picnic area facing the roadway through the park.

Mr. F. W. Libbey, chairman of the inscription committee, had asked for and received various suggestions from members of the Society as to wording of the inscription. After consulting with various geologists and members, the following was decided upon:

"Through the fiery throat of this volcano exploded glowing cinders which, cooling, formed the ground on which you now stand. Younger than the hundreds of volcanoes which poured out their lavas in the foothills of Mt. Hood, this cinder cone has withstood the ravages of time to become Mt. Tabor. It now stands peacefully in the City of Roses, the only major city in the United States that has a volcano within its borders.

"This tablet was installed by the Geological Society of the Oregon Country August 8, 1952. "

President Stone, Dr. Stevens, Mr. Libbey, and others who worked with them toward accomplishment of this installation are to be greatly commended for their efforts. We will feel justifiable pride in the years to come over this plaque at the site of Mt. Tabor's volcano.

J.E.

BULL RUN WATERSHED FIELD TRIP: GSOC, Water Bureau

Evelyn Pratt, 7/6/06

(Editor's Note: This is part one of a two-part article on the June 25, 2006 GSOC field tour of Bull Run Watershed. The remainder of the article will appear in next month's newsletter.)

Our knowledgeable Water Bureau guides were Briggy Thomas and Jeff Leighton. Also GSOC Past President Beverly (Bev) Vogt, who wrote her Master's thesis on Columbia River Basalts in the Bull Run Watershed, clarified the geology of the Watershed a great deal. We received a tremendous amount of information from all three, and if we remember even half of it, we'll know a lot more than we did about Portland's water supply and its origins.

HISTORY OF THE WATERSHED

In the 1850's, Portlanders drank Willamette River and well water. A private company provided it, and also disposed of sewage and industrial waste. In the meantime, not surprisingly, typhoid and cholera cases increased. In 1885 Colonel Isaac Smith was told, "Find a new water source." After exploring the area, he suggested Bull Run Lake. The governor was afraid that drinking glacial waters from Mt. Hood would lead to goiters. It was then proved that there was no connection between the Bull Run Watershed and runoff from Mt. Hood. Most of the watershed's water comes from rain, and is very soft (low mineral content).

In 1892 a small diversion wall was built. In Portland two reservoirs were excavated alongside Mt. Tabor and two in Washington Park. By 1895 metal pipes were bringing Bull Run water 25 miles to Portland.

Also in 1892, the Timber Reserve Act gave Federal protection to the watershed. By 1904 another act had been passed to supplement it, which included keeping cows out. From 1958 to 1993, logging was allowed in the watershed. In the '70's Dr. Joe

Miller, a resident of nearby Marmot, watched a lot of log trucks go by his place. He hired a plane, flew over the Bull Run Watershed, and saw how much logging was being done. He then called the joint managing agencies - the U.S. Forest Service and Portland Water Bureau - to task, saying, "You're violating legislation by logging." Thanks in large part to his efforts, in 1977 the Forest Service was allowed to log only for forest management and for windstorm salvage. He continued to work toward barring logging completely from the watershed. No logging has been allowed since 1993.

When Bev wanted to work in the area on her thesis in 1976, she had to go before Judge James Burns to get permission to enter and work in the Watershed, and had to promise that the only equipment she'd use to study the Columbia River Basalt would be her rock hammer. Since the area had been logged for quite a few years, she saw many clearcuts at that time. On this GSOC field trip, 30 years later, most of the clearcuts have grown over and there is a lot more vegetative cover than there was.

WILDFLOWERS IN THE WATERSHED

Up near Lolo Pass the rhododendrons and beargrass were at their very best. A lot of small dark penstemons grew on rocky dry slopes near there. As we descended, we saw a few red columbines; farther down there were more. There were also plenty of dwarf dogwood, a few tiger lilies, and quite a bit of native (?) blackberry.

Lower down:

Bigleaf lupine
Goatsbeard
1 or 2 oceanspray, not yet blooming
Indian paintbrush
A few mimulus
Plenty of Scotch broom
Daisies
Sedges
Thimbleberry in bloom at mid-altitudes

Still lower:

Foxglove
1 clump of purple/white iris
Coast (?) dandelion
A few mountain spirea

Water Station 22

A DYC with 8 or fewer ray flowers around darker center

1 or 2 blue elderberries in bloom



THE 2006 GSOC PRESIDENT'S FIELD TRIP

September 8 through September 10, 2006

Tentative Itinerary for Klamath Basin Geology Field Trip

Friday, September 8, 2006

Leave Portland in the morning in private vehicles. First session will be a general presentation on Klamath Basin geology given by Dr. Bill Elliott (Klamath County Courthouse, 316 Main Street) at 7pm. Field guide materials will be provided to all attendees.

Saturday, September 9

Trip Leader: Bill Elliott, Dept. of Geology, Southern Oregon University (more information about Dr. Elliott next page)

8:30 AM Departure (location TBD)

- Stop 1: **Exposures along Highway 97** – hydroclastites and volcanoclastics; overview of Miocene to Pleistocene stratigraphy.
- Stop 2: **Normal fault surface exposed along Highway 97** – timing of fault movement, Basin & Range extension, and implications for geological hazards.
- Stop 3: **Upper Klamath Lake overlook** - Basin & Range extension and normal faulting; overview of southern Oregon tectonics.
- Stop 4: **Collier Grade** – stratigraphic section of Pliocene to Pleistocene lacustrine sediments capped by a Pleistocene lava flow. A thin veneer of Mazama ash is exposed at the top of the hill.

Lunch at Collier State Park

- Stop 5: Ruttas of the Gods & Sprague River Valley** – rhyolite intrusive plugs; Pliocene lacustrine sediments including diatomite; geomorphology of the Sprague River Valley.
- Stop 6: Devil's Garden** – eroded hydroclastite volcano in a downthrown normal fault block; examine fault surface and associated colluvium; exposures of pillow basalts, hydroclastites, and volcanoclastics.
- Stop 7: Lost River Water Gap** – Short hike (1 mile) along Rails to Trails path to examine Miocene to Pliocene diatomite and other lacustrine sediments.
- Stop 8: Normal Faulting** – examine fault surfaces, volcanoclastic and hydroclastic sediments, and Basin and Range basalts east of Highway 39, south of Klamath Falls.

5:30 PM Return to Klamath Falls

September 10: Leave Klamath Falls and travel 50 miles south to Lava Beds National Monument in the morning (\$10.00 entrance fee per car good for 7 days). Itinerary for afternoon yet to be determined. Participants can either return to Klamath Falls on Sunday night or reserve one of 43 camping sites at the Monument (additional \$10 per night for campsite with restroom facilities and water that will accommodate two cars/two tents). For those wanting to stay, a separate two-day extension is described below.

September 11 and 12: optional two-day trip led by Richard Bartels to further explore Lava Beds National Monument and Medicine Lake Volcano, also across the border in northern California. The only cost of the optional trip will be \$10 for copying of field trip guides, payable to Bart at the beginning of the optional trip. If you are interested in the optional trip, call Richard Bartels, 503-292-6939, for more information.

Bill Elliott is an Assistant Professor in the Geology Department at Southern Oregon University. He obtained a B.S. (1995) degree in geology from the University of Pittsburgh at Johnston and then continued his studies at Indiana University-Bloomington earning M.S. (1998) and Ph.D. (2002) degrees in Geological Sciences. His research interests encompass sedimentology, stratigraphy, geomorphology, and low temperature geochemistry. Specifically, he is interested in relationships between tectonics and climate in continental depositional settings. Since arriving at Southern Oregon University, Dr. Elliott is involved in several research projects investigating (1) stable carbon isotopes of terrestrial organic matter and clay minerals in the Upper Cretaceous Hornbrook Formation of southwestern Oregon, (2) geochemistry of acid mine drainage from the Blue Ledge Mine in Siskiyou County, California, and (3) sedimentology and stratigraphy of Miocene to Pleistocene volcanoclastics and hydroclastites of the Basin and Range province of Klamath County, Oregon.

Motels, RV Park, and Campground for the President's Field Trip to Klamath Falls

Here are some suggestions for motels, campground, or RV accommodations in Klamath Falls. Field trip participants are expected to make their own arrangements for lodging and meals.

- Quality Inn (closest to Co. Courthouse and Friday night lecture): 1-541-882-4666
- Maverick (less expensive -- about 10 blocks from Courthouse): 1-541-882-6688
- Holiday Inn Express (5-minute drive): 1-541-884-9999
- Best Western Olympic Inn (5-minute drive): 1-541-882-9665
- Oregon Motel 8: 1-541-883-3431
- Motel 6: 1-541-884-2110
- Klamath Falls KOA: 1-541-884-4644
- Oregon 8 RV Park 1-541-883-3431

**President's Field Trip
Klamath Basin
September 8 through September 10, 2006**

Tentative Itinerary for Klamath Basin Geology Field Trip – see August 2006 Geological Newsletter for details

Note: Transportation to and from Klamath Falls is the participant's responsibility.

Friday, September 8, 2006

General presentation on Klamath Basin geology given by Dr. Bill Elliott (Klamath County Courthouse, 316 Main Street) at 7pm. Field guide materials will be provided to all attendees.

Saturday, September 9

Trip Leader: Bill Elliott, Dept. of Geology, Southern Oregon University. Carpool to sites discussed in field guide materials.

September 10: Lava Beds National Monument

September 11 and 12: optional two-day trip led by Richard Bartels to further explore Lava Beds National Monument and Medicine Lake Volcano, also across the border in northern California. Cost of the optional trip will be an additional \$10 payable to Bart at the beginning of the optional trip. Call Richard Bartels, 503-292-6939, for more information.

Cost of the President's Trip and Payment

Cost of the President's Trip (Sept. 8-10) is \$20 for GSOC members and \$25 for nonmembers. Field trip participants are expected to make their own arrangements for transportation, lodging (see list of possible motels in Klamath Falls elsewhere in the Newsletter), pay for their own meals, and pack a lunch and carry water each day. Please make checks out to the "President's Field Trip" and send to the Geological Society of the Oregon Country, P.O. Box 907, Portland, Oregon 97207-0907 by **August 30, 2006**.

Policy for Minors: In order to attend a GSOC field trip, participants under 21 are required to have permission in writing from a parent or other legal guardian. In addition, minors must be accompanied by a parent, guardian, or responsible adult designated by that person.

Name(s) _____

Name(s) _____

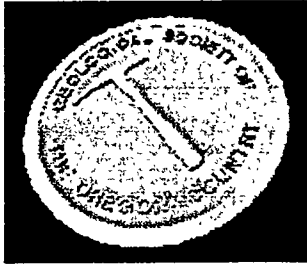
Number of registrants _____ Payment enclosed _____

Address _____

Telephone _____ Email _____

For questions contact Bonnie Prange (bonnie@eco-land.com; (days) 360-578-1371)

Important: A waiver/medical form for each participant must accompany this registration form. See next page.



Geological Society of the Oregon County
P.O. Box 907
Portland, Oregon 97207-0907

President's 2006 Field Trip to the Klamath Basin

Note: Please fill out a separate waiver form for each participant.

I understand that the Geological Society of the Oregon County field trips may involve inherent risks. I realize that natural hazards do exist, and that falls and collisions do occur, that therefore injuries may result, and therefore accept the risks to myself and others and I agree to use extreme caution at all times on this trip.

I understand that any costs for medical expenses incurred as a result of accidental injury or death while participating in the field trip WILL NOT BE PAID BY THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

I, undersigned, intending to be legally bound, hereby for myself, my heirs, executors, and administrators, waive and release any and all rights and claims for losses and damages I may have against the Geological Society of the Oregon Country, its officers, board members, and field trip leaders, and all other parties and their representatives, successors, and assigns for all and any injuries suffered by me on this field trip. I attest and verify that I am participating at my own risk.

Signed: _____ Dated: _____

Parent or other legal guardian signature: _____

Medical Information

Name _____

Phone number _____; Email _____

Name of physician _____; Phone number _____

Allergies _____

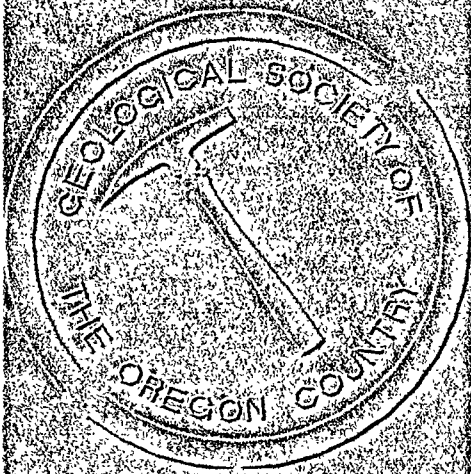
Special medications _____

Special medical conditions _____

In Case of Emergency call _____

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**THE
GEOLOGICAL
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GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

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ACTIVITIES:

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

FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.

GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details

GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.

PROGRAMS: Second Friday evening most months, 8:00 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon.

MEMBERSHIP: Per year from January 1: Individual--\$20.00, Family--\$30.00, Junior (under 18)/Student--\$10.00.

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Name _____ Spouse _____

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GEOLOGICAL NEWSLETTER

The Geological Society of the Oregon Country
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VISITORS WELCOME AT ALL MEETINGS.
INFORMATION: www.gsoc.org

VOL. 72, NO. 9
SEPTEMBER, 2006

Bonnie Prange, President, 360-693-8396, bonnie@eco-land.com
Acting Calendar Editor, Beverly Vogt, 503-292-6939, bevvoigt@comcast.net

SEPTEMBER ACTIVITIES

There will be no Wednesday night seminar or Friday night lecture in September because of the President's Field Trip.

September 8 through 10 (Friday to Sunday morning): President's Annual Field Trip—this year to the Klamath Basin and plus optional trip starting on morning of September 10 through September 12 to Lava Beds National Monument and Medicine Lake Volcano in northern California. See more details in the August Newsletter or at the GSOC website (www.gsoc.org). People registering for the President's Trip must fill out the registration forms in the Newsletter. People planning on attending the optional trip should contact Richard Bartels (503-292-6939 or bevvoigt@comcast.net) so he knows how many copies of printed material to make. Cost of the President's trip is \$20 for GSOC members and \$25 for nonmembers, and attendees are responsible for their own lodging and meals. People planning on attending the optional trip will pay Richard Bartels \$10 for printed material at the beginning of his trip and a \$10 entry fee to Lava Beds (good for one week) and will also be responsible for their own meals and lodging (either motels or camping). GSOC is reserving the group campsite at Lava Beds National Monument for three nights (September 10, 11, and 12), and campers will pay a nightly fee to stay there. Anyone with questions about the President's Trip should contact Bonnie Prange (1-360-578-1371 [days] or bonnie@eco-land.com). Anyone planning on staying at the group campsite at Lava Beds National Monument or who has questions about the optional trip should contact Richard Bartels.

Future Upcoming Event

Friday Evening Talk, October 13, 2006: Terry Tolan of Groundwater Solutions, Inc., Kennewick, Washington, and expert on Columbia River Basalt and related geology in Washington and Oregon will speak on the geologic history of the Columbia River and locations of the ancestral Columbia River channels. Location: Room S17, Cramer Hall, Portland State University, 1721 SW Broadway, between Montgomery and Mill. (Room S17 is on the sub-basement level of Cramer Hall, directly below the Geology Department's main office.)

PARKING AT PORTLAND STATE UNIVERSITY IS AVAILABLE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL.

DETAILS ON UPCOMING GSOC EVENTS

September 8 though 10 (Friday through Sunday): Presidents Annual Field Trip—this year to the Klamath Basin and Lava Beds National Monument, plus optional trip on September 11 and 12 to Lava Beds National Monument and Medicine Lake Volcano in northern California. See more details in August 2006 Newsletter.

Information for people attending the optional field trip to Lava Lands National Monument and Medicine Lake Volcano

GSOC members and fellow travelers who plan on taking part in the optional trip to Lava Lands National Monument and Medicine Lake Volcano (September 10 though 12) should contact Richard Bartels (503-292-6939 or bevvoigt@comcast.net) to state their intentions so he knows how many copies of printed material to make and how many people plan to camp at the Lava Beds National Monument group campsite.

Nominating Committee named

At its last meeting, the Board selected the Nominating Committee, who will be looking for next year's GSOC officers. The members of this year's Nominating Committee are Janet Rasmussen, Chair; Bonnie Prange; and Richard Bartels. If you are interested in serving as an officer or on the Board, please contact one of them.

GSOC Seminar Announcement

Seminars will be coming back soon, and I am looking for ideas. If you have any suggestions, please e-mail Tara Schoffstall at tschoffstall@yahoo.com. Thanks!

GSOC BOARD MEETING

Summary of August 13, 2006, GSOC Board meeting

The meeting was called to order by President Bonnie Prange at the annual picnic held this year at Mount Tabor Park. Board and GSOC members present included Bonnie Prange, Richard Bartels, Beverly Vogt, Marvel Gillespie, Janet Rasmussen, Larry Purchase, Rosemary Kenney, Tara Schoffstall, and Clay Kelleher.

Bonnie Prange announced that Bill Elliott from Southern Oregon University will lead the President's trip for one day, followed by a trip led by Bonnie and Richard Bartels to Lava Beds National Monument and Medicine Lake Volcano. Potential campers at Lava Lands are to contact Bonnie so they can camp in the group camp site.

Vice President Richard Bartels announced there will be no September speaker but that Terry Tolan will be the Friday night lecturer on October 13. He will speak on the ancestral Columbia River channels.

Tara Schoffstall said there will be no Wed. night seminar in September and that she is looking for ideas on what people are interested in as she plans future seminars. She is trying to get computer access for the seminars, which means she has to get a PSU password.

Because of lack of interest, Clay will not pursue having GSOC purchase a slide scanner.

Nominating Committee members were determined, and the nominees are to be announced in the November newsletter, which means the slate of nominees has to be sent to the newsletter editor for the November Newsletter by mid-October.

Next board meeting is scheduled for 10:00, October 14, 2006, at Rosemary Kenney's house.

BULL RUN WATERSHED FIELD TRIP: GSOC, Water Bureau

Evelyn Pratt, 7/6/06

(Editor's Note: This is part two of a two-part article on the June 25, 2006 GSOC field tour of Bull Run Watershed. The beginning of the article appeared in last month's newsletter.)

Our knowledgeable Water Bureau guides were Briggy Thomas and Jeff Leighton. Also GSOC Past President Beverly (Bev) Vogt, who wrote her Master's thesis on Columbia River Basalts in the Bull Run Watershed, clarified the geology of the Watershed a great deal. We received a tremendous amount of information from all three, and if we remember even half of it, we'll know a lot more than we did about Portland's water supply and its origins.

BULL RUN WATERSHED GEOLOGY

Columbia River Basalt (CRB) underlies the entire Watershed. It's exposed only along waterways and along some of the roads. The rest of the Watershed is covered mostly with younger Pliocene and Quaternary volcanic rocks such as basalt, andesite, and mudflows. The top of the CRB has been measured at 720 feet above sea level in a drillhole at Old Maid Flat, just a few miles to the east of the Lolo Pass Road. In Bull Run, in the Bull Run anticline, it occurs at 3,100 feet.

The tour followed the Watershed both geologically and chronologically. We started at the Lolo Pass entrance on the east side of the Watershed, and followed Road 10 to the west. A quarter of a mile inside the gate, Bev pointed out the first of several exposures of platy andesite, less than 5 million years old, that we were to see. Right about then an adult black bear crossed the road at a leisurely pace, and for a few minutes water and geology were forgotten in favor of bear-watching.

Fire regulations in the Watershed are very strict. The focus is on prevention. All 15 people who work in the Watershed are trained in firework. A

fire lookout on Hickman Butte is manned in summer. Bull Run has priority for fire fighting resources if any fires spring up in this part of the state. Over 300 miles of roads, many of them left over from logging, crisscross the Watershed. A survey has determined which are needed for fire prevention, and those not necessary for this use will be decommissioned.

We continued east on Road 10, passing the totally hidden Bull Run thrust fault to the left of the bus several hundred feet below us along Blazed Alder Creek. Soon after the road turned sharply to the northeast and entered the actual Bull Run drainage, we saw a huge pile of talus that goes on and on, next to the right side of the road. The talus has developed over the years from erosion of a long andesite ridge above it.

BIG BUS TURNAROUND

We came to a sharp U-turn that the big bus obviously couldn't negotiate, so we continued to what, with some imagination, could be called a turnaround spot. The driver, with the help of the Water Service people and others, spent 15 or 20 minutes jockeying the bus around while the rest of us followed Bev and Bart up the road to an outcrop of brecciated volcanic rock. The main indication of a big underground thrust fault in the east part of the Watershed is the presence of highly brecciated Columbia River Basalt. It is the only evidence of the thrust fault anywhere along a Watershed road. In this case, the rocks we were looking at were from the overthrusting plate of CRB on the thrust fault. Some of the breccia appeared so hard that it looked like regular rock, but it shattered into many small fragments when hit with a rock hammer.

LUNCH STOP BY BULL RUN RESERVOIR/LAKE

Bull Run Lake is in an old cirque, where the outlet was dammed by a large landslide. As was mentioned earlier, Bull Run is separated from Mt. Hood runoff, and the water in Bull Run comes from rainfall into the watershed. The lake is around 270 feet deep. Federal fish-protection regulations direct

the Portland Water Bureau to release cold water, not warm, into streams running out of the reservoir.

GEOLOGIC HISTORY OF CRB

General, local

Bev and Bart carried in samples of various basalts and a diagram to lay on a picnic table by Bull Run Lake. (See pp. 1,3 in Vogt thesis.) There Bev discussed the Columbia River Basalts in general and local flows in particular - several of which are Grande Ronde and Wanapum Basalts.

Back in the '60's and 70's, people were working on the Columbia Plateau in and around the Hanford Reservation in Washington state to determine if the site was suitable for becoming a nuclear repository. These researchers began to see that Columbia River Basalts differed from each other in various ways such as by chemical content, presence or absence of plagioclase phenocrysts, magnetic polarity, jointing characteristics, and relative stratigraphic position. In the early '70's, Dr. Marv Beeson of Portland State University used Reed College's nuclear reactor to find that individual basalt flows had differing kinds and amounts of trace elements. At that time most of the government-funded research about CRB's was going on near where it originated in eastern Oregon, Washington, and western Idaho. Dr. Beeson gathered a group of grad students, including Bev Vogt, Terry Tolan, Jim Anderson, and Sue Timm, and set them to work deciphering where various rivers of CRB had flowed in western Oregon, far from their sources.

Marv and his students discovered several paths followed by the ancestral Columbia River as it wound its way through the Cascades to the ocean. These channels were identifiable because various Columbia River Basalts had flowed into them, preserving the riverbeds in rock. Drilling in Old Maid Flat led to the discovery of 15 million-year-old Grande Ronde Basalt in the oldest known Columbia River channel in the region. The Bull Run Watershed has been inundated by several Grande Ronde high and low magnesium flows, most with normal magnetism and one with reverse. (See p. 3 in Vogt thesis.) Somewhat later Wanapum flows, including 6 Frenchman Springs

Members and 1 Priest Rapids Member, also entered the Watershed. The latter filled in a lot of spaces locally.

The 14.5 million-year-old Priest Rapids intercanion flow entered a lake near The Dalles, exploding into hyaloclastic rubble that poured through the Hood River Valley, then through the Bull Run area down to where it formed Crown Point, where it is exposed today as rubble below and collonade and entablature above. (See diagram, p. 4 in Vogt thesis.) A couple million years later (12 million years ago), the Pomona Member intracanyon flow ran where Mitchell Point is now, on to Bridal Veil, then northwest. So the Columbia River has been the conduit for basalt three times in this area. Each time the river was displaced it had to move more or less north, until it got to its present-day channel.

Large-scale tectonism has affected all of this part of Oregon. The north-south compression produced a set of northeast-southwest-trending folds (a syncline and thrust-faulted anticline) in Bull Run, similar to the Yakima folds found to the northeast on the Columbia Plateau. Breccia and slickenside indicate locations of the thrust fault in the Bull Run anticline. The steep thrust-fault-affected anticline makes for plenty of beautiful waterfalls in the area.

From Bull Run Reservoir the main road basically follows the Priest Rapids intercanion flow, which has been exposed by erosion of both the Bull Run and North Fork Rivers. We were told that there'd been a huge forest fire here several hundred years ago, and that most watershed trees were less than 500 years old. (700 years old is the maximum that's been found.) At one point we had a good view of Falls Creek Falls. The million-year-old Vantage horizon, the main division between Grande Ronde and Wanapum Basalts, is exposed near the top of the falls.

SENTINEL BLUFF BASALT

A cliff of Sentinel Bluff basalt, the youngest Grande Ronde flow, loomed above our next stop at North Fork. Tasty wild strawberries made this stop memorable.

A bit farther along, a freight-car-sized mass of woody debris sat by the roadside. The Water Bureau is required to remove woody stuff that lodges against the log boom upstream from Reservoir #1's dam. That's where this stack came from. Large woody debris has an important role for wildlife - it will be put in streams to make good fish habitat.

RESERVOIR #1 STOP

The reservoir is really full this year. It is kept full (10 billion gallons) until the water is needed downstream. Usually, drawdown starts around July 4. To lower the reservoir 1 foot takes less than 3 hours, with water flowing about 1200 cubic ft./sec (cfs). Although it's computerized, most of the system can be operated manually if necessary.

The reservoir is held back by a concrete dam with 9 gates. Below the dam is a building where hydropower is generated. Temperature maintenance for the benefit of fish is legally important. Early in the season, say up to the end of June, water is drawn from the top of the reservoir and let out downstream. By mid-July or so the reservoir's surface water has warmed up - 16°C is too warm for anadromous fish - and middle layers are being used. By August, the discharge comes from cool water just above the floor of the reservoir. There's a good exposure of the Vantage horizon, with Grande Ronde basalt below and Frenchman Springs above, by the entrance to the top of the dam.

RESERVOIR #2 STOP

This dam is earth and rock. It holds back 7 billion gallons of water or more. The water has 4 ways of getting to the diversion pool. ¼" to ½" screens filter out any debris larger than those sizes. Then the water's divided into fish-water and people-water, and chlorine is added to the latter. It's only 6 miles to the Sandy River from here, so steelhead, coho, and chinook can make it this far.

The contact zone between two members of Grande Ronde Fm. flows - the older Ortley and younger Winter Water - is very porous, and makes a good

aquifer. Most of the water in the test-production well came from 510 to 550 feet below the surface of the ground. We saw cores taken 35 feet from the test-production well in the pillow lava at the base of the Winter Water, in the sedimentary interbed, and in the Ortley basalt flow top.

Water pressure in the artesian wells below the dam is the same as water pressure in the reservoir, giving the wells a considerable head (950 to 1000 gallons/min. without pumping). The test-production well near where the cores were taken was installed in 2001 and is 16 inches in diameter and 600 feet deep. "Shut in pressure" in the flow zone is more than 70 pounds per square inch. Contact is about 509 ft. below ground level.

KAISER PARK

Kaiser Park was a settlement that was made for employees of the Water Bureau. It was abandoned in the '60's. Houses have been dismantled, but there are still several interesting fountains and walls. A wide spillway descends toward the river here.

COLUMBIA SOUTH SHORE WELLFIELD

"Floods, landslides, and high turbidity events underscored Bull Run's vulnerability as a single unfiltered water source. In the early 1980's, the bureau [added] the Columbia South Shore Well Field, installing more than 20 wells which now can provide almost 100 million gallons a day." (Portland Water Bureau handout)

Industries dominate the area between northeast Portland and the river. In 1987 it was necessary to put a groundwater protection plan into effect. Boeing and Cascade, once guilty of contaminating the well field, have since put in extraction and cleanup systems. In 2003, businesses in Portland, Fairview, and Gresham got together to formulate a new Groundwater Protection Program that enforces stricter dumping regulations regarding certain chemicals.

Whether Portland's water comes from the Bull Run Watershed or is mixed with Columbia South Shore

Wellfield, it certainly offers one of the healthiest and best-tasting sources of drinking water in the nation.

GLOSSARY OF TERMS USED IN THE ARTICLE

Andesite: a volcanic rock with more silica than basalt and less iron and magnesium; usually dark-colored, with phenocrysts (qv below) of various minerals

Anticline: an upward fold with older rocks in the middle

Breccia: angular broken rock fragments held together by a mineral cement or a fine-grained groundmass

Colonnade: the lower part of a lava flow with well-formed parallel shrinkage joints

Entablature: the upper part of a lava flow with irregular "brickbat" texture

Hyaloclastic: rubble formed as lava comes into contact with water, solidifies, and shatters

Magnetism, normal and reversed: Normal magnetism = a compass needle points toward the north magnetic pole. Reversed magnetism refers to those times in geologic history when a compass needle would have pointed south.

Phenocryst: a fairly large and somewhat conspicuous crystal in an igneous rock

Plagioclase: a common rock-forming type of feldspar

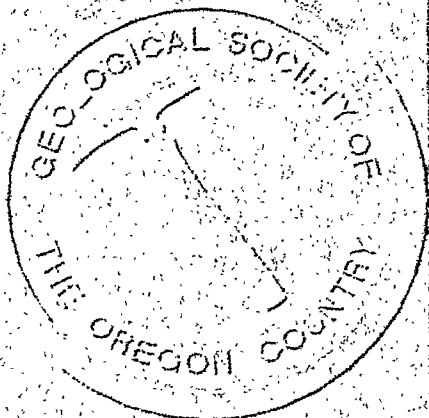
Slickenside: a polished, striated rock surface resulting from friction when one rock plane moves against another (Note: If you stroke slickenside in one direction, it's smooth; in the opposite direction, it feels rough.)

Tectonism: having to do with major earth structures and their relation to movements of the earth's plates

Thrust fault: a fault that dips less than 45°, where the upper (hanging) wall appears to have moved upward relative to the lower (foot) wall

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Bonnie Prange, President, 360-693-8396, bonnie@eco-land.com
Calendar Editor, Beverly Vogt, 503-292-6939, bevvoigt@comcast.net

OCTOBER ACTIVITIES

Friday Evening Talk, October 13, 8:00 p.m., Terry Tolan of Groundwater Solutions, Inc., Kennewick, Washington, will speak on "The Columbia River Versus 16 Million Years of Volcanism and Tectonism: A Brief Overview of the Geologic Evolution of the Columbia River System". Tolan's talk will focus on the Columbia River system from the Columbia Plateau to the Pacific Ocean and the geologic events and processes that shaped its evolution. Location: Room S17, Cramer Hall, Portland State University, 1721 SW Broadway, between Montgomery and Mill. (Room S17 is on the sub-basement level of Cramer Hall, directly below the Geology Department's main office.)

Seminar, Wednesday evening, October 18th, 8 p.m. Seminar topic will be a general discussion of the President's 2006 Field Trip to the Klamath Basin, Oregon, and Lava Beds National Monument and Medicine Lake volcano in northern California. Highlights will include the geology and history of all three areas. Please feel free to bring your own pictures and experiences to this seminar! Location: Room S17, Cramer Hall, Portland State University, 1721 SW Broadway, between Montgomery and Mill. (Room S17 is on the sub-basement level of Cramer Hall, directly below the Geology Department's main office.)

PARKING AT PORTLAND STATE UNIVERSITY IS FREE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

DETAILS ON UPCOMING GSOC EVENTS

Nominating Committee named

At its last meeting, the Board selected the Nominating Committee, who will be looking for next year's GSOC officers. The members of this year's Nominating Committee are Janet Rasmussen, Chair; Bonnie Prange; and Richard Bartels. If you are interested in serving as an officer or on the Board, please contact one of them.

GSOC Seminar Announcement

Seminars will be coming back soon, and I am looking for ideas. If you have any suggestions, please e-mail Tara Schoffstall at tschoffstall@yahoo.com. Thanks!



THE 2006 GSOC PRESIDENT'S FIELD TRIP RECAP

Missed this year's field trip? Don't despair! We have some tidbits for you here from the trip field guide, and hopefully the entire field trip guide will be available at some point in the near future. Stay posted!

Here are some excerpts from the "Field Trip Guide to the Geology of the Upper Klamath Basin, Klamath County, Oregon", by Field Trip Leader Bill Elliott, Southern Oregon University. The trip described in the guide occurred during the 2006 GSOC President's Field Trip on Sept. 9, 2006.

Introduction

The landscape of the Upper Klamath Basin and surrounding areas is dominated by northwest to north trending normal faults that dissect a complex continental volcanic sequence containing thick packages of lacustrine sediments. Normal faulting in the Klamath Falls area is related to extension associated with the Basin and Range province. Activity along these faults probably started in the Pliocene and some remain active today. In 1993, a 5.9 magnitude earthquake was followed by a 6.0 magnitude earthquake, both with epicenters located near Aspen Lake. One of these earthquakes resulted in 2 fatalities; one near Modoc Point caused by a boulder hitting the passenger side of a car on Highway 97. Thus, determining the location and timing of movement along these normal faults is important to better constrain the risks of earthquake hazards in the vicinity of Klamath Falls (Wiley and others, 1993).

In addition, detailed geologic mapping of lacustrine and continental volcanic rocks as well as normal faults of the Upper Klamath Basin provides information about the subsurface architecture of potential groundwater aquifers. Since brecciation along normal faults may act as conduits for the flow of groundwater, this structural information is fundamental to modeling groundwater movement in these structurally complex terranes. Finally, the exposures in the Upper Klamath Basin may provide insights into the timing and style of deformation associated with Basin and Range extension in southern Oregon.

Geologic Mapping in the Upper Klamath Basin

One of the first geologic maps of the Upper Klamath Basin was produced by Merewether (1953), who focused on the lower Sprague River Valley. Wells and Peck (1961) produced a regional geologic map of Oregon west of the 121st meridian at a scale of 1:500,000. A later study by Peterson and McIntyre (1970) yielded a geologic map highlighting mineral resources of Klamath and western Lake Counties in southern Oregon. Sherrod and Pickthorn (1992) produced a 1:250,000 scale geologic map of the west half of the 10 by 20 Klamath Falls quadrangle. In recent years, the focus has shifted from the compilation of regional geologic maps to conducting detailed geologic mapping of 7.5-minute quadrangles at a scale of 1:24,000. Over the last decade, several detailed 1:24,000 geologic maps have been completed by the Oregon Department of Geology and Mineral Industries (DOGAMI) within the 10 by 20 Klamath Falls quadrangle (Hladky, 2003a, 2003b; Jenks and Madin, 2003; Jenks, 2004). Geologic mapping at 1:24,000 will continue by DOGAMI and a compilation 1:100,000 map of the 30 x 60 minute Klamath Falls quadrangle is currently in preparation (M. D. Jenks, 2006, personal communication).

Structure

Block faulting in the Klamath Falls area was first interpreted by Johnson (1918); his observations verified by G. K. Gilbert in the field prior to publication. Generally, the Upper Klamath Basin is dissected by a series of north to northwest trending normal faults accommodating Basin and Range extension in the northern portion of the Great Basin province (Sherrod and Pickthorn, 1992; Christiansen and McKee, 1978). Eaton (1984) interprets the extension associated with the Miocene Great Basin as a back-arc tectonic setting. Normal faults in the Upper Klamath Basin are trending N50W to N35W with dips of 50° to 60° (Fig. 2). The eastern margins of major half-grabens, such as Upper Klamath Lake and Swan Lake Valley, have well-delineated fault escarpments of 300 to 400 meters in relief that are trending N30W and dipping 55° to 60° southwest. The western edge of these half-grabens is defined by lower relief, northwest trending normal faults that dip toward the northeast.

Geologic History

The oldest silicic volcanic rocks in the Upper Klamath Basin are Late Miocene (5 to 6 Ma) porphyritic rhyolite and dacite domes north of Beatty and on Bly Mountain near the upper Sprague River Valley (McKee and others, 1976; Sherrod and Pickthorn, 1992). More mafic rocks, such as basalts and andesites, range in age from the Late Miocene to Pleistocene (5 to 1 Ma) in the Upper Klamath Basin. This suggests that volcanism in the Upper Klamath Basin during the Late Miocene was produced by a wide range of magma compositions.

Tuff cones and/or hydroclastic vent deposits within the area are Late Miocene to Pliocene (2 to 5 Ma) in age. Tuff cones form when basaltic to andesitic magma comes in contact with groundwater or interacts with lakes at the surface, resulting in low temperature (less than 100°C), wet pyroclastic surges (Wohletz and Sheridan, 1983). These poorly inflated surges result in the deposition of volcanic breccia and sandstone beds with 20° to 30° dips deposited outwardly from the eruptive center. This volcanic feature is called a tuff cone or hydroclastic vent deposit. Numerous tuff cones and/or hydroclastic vents occur in the Upper Klamath Basin (Fig. 3), attesting to widespread lacustrine environments throughout the region from the Late Miocene to Pliocene. The timing of the tuff cones is consistent with basaltic to andesitic volcanism in the Upper Klamath Basin.

Continental sedimentary rocks in the Upper Klamath Basin consist of conglomerates, breccias, sandstones, siltstones, mudstones, and diatomite. There have been numerous mammalian and fish fossils recovered from these continental sedimentary rocks, establishing a Late Miocene to Pleistocene (8 to 1 Ma) age (Sherrod & Pickthorn, 1992; Newcomb, 1958). Newcomb (1958) assigned the continental sedimentary rocks along with overlying basaltic lapilli tuff in the Klamath Falls area to the Yonna Formation. The Yonna Formation was later abandoned by Sherrod and Pickthorn (1992), who distinguished volcanogenic deposits from continental sedimentary rocks. From bedding structures and fossils, these continental sediments are interpreted to have been deposited in widespread lacustrine environments, similar to the sediments currently accumulating in Upper Klamath Lake.

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FURTHER INFORMATION CONCERNING LAVA BEDS NATIONAL MONUMENT AND MEDICINE LAKE VOLCANO

The Official Home Page of Lava Beds National Monument: <http://www.nps.gov/labe/>

USDA/US Forest Service, "Medicine Lake Highlands: Self Guided Roadside Geology Tour", McCloud Ranger Station - Shasta-Trinity National Forest: <http://www.fs.fed.us/r5/shastatrinity/documents/st-main/maps/rogs/mccloud/mdl-tour.pdf#search=%22Medicine%20Lake%20geology%22>

USGS website, Bathymetric, geophysical and geologic sample data from Medicine Lake, Siskiyou County, northern California: <http://geopubs.wr.usgs.gov/open-file/of00-043/>

USGS CVO Website, Medicine Lake Vicinity, California, Lava Beds National Monument: <http://vulcan.wr.usgs.gov/Volcanoes/MedicineLake/Locale/framework.html>,
<http://vulcan.wr.usgs.gov/Volcanoes/MedicineLake/Publications/GeoMedLake/framework.html>

USGS, Geology of National Parks link page: <http://3dparks.wr.usgs.gov/>

Travel the Volcanic Legacy Scenic Byway! Website <http://www.volcaniclegacybyway.org/index.html>

Wikipedia article on Lava Beds National Monument, Medicine Lake, and the Modoc War:

http://en.wikipedia.org/wiki/Lava_Beds_National_Monument,

http://en.wikipedia.org/wiki/Medicine_Lake_%28California%29,

http://en.wikipedia.org/wiki/Modoc_Wars

A History of American Indians in California: Historic Sites. Website

http://www.cr.nps.gov/history/online_books/5views/5views1.htm and Modoc County history on

http://www.cr.nps.gov/history/online_books/5views/5views1h11.htm

Klamath Basin birding website: <http://www.klamathbirdingtrails.com/birdingsites.html>

Smithsonian Institution Global Volcanism Program: <http://www.volcano.si.edu/world/>

GORP website guide to the monument: http://gorp.away.com/gorp/resource/us_nm/ca_lava.htm

About.com: California Geology Destinations: http://geology.about.com/od/geology_ca/a/aaCA_geotourism.htm

Long-time GSOC member Dorothy Waiste dies

Dorothy Waiste died September 12, 2006. A native Oregonian, she was born on a farm in the South Oak Grove District near Molalla. She graduated from the Oregon Normal School, now Western Oregon University, and taught at North Highland and Clarke Elementary Schools in Clackamas. Later she worked at the Santa Ana Army Airbase in California and for the Idaho Bureau of Mines and Geology, the School of Mines of the University of Idaho, and the Portland District Corps of Engineers.

She married Robert Waiste, Jr., on July 18, 1955, and lived the rest of her life in Portland. Bob died December 24, 1997. Dorothy and Bob joined GSOC in 1963 and enjoyed many GSOC trips and campouts, especially one that Bob led to Perkins Lake in Idaho. Dorothy served as GSOC secretary and business manager for 22 years. She is survived by a nephew, a sister-in-law, many cousins, and numerous friends.

OTHER UPCOMING GEOLOGY EVENTS

2nd Annual Oregon Geological Symposium, sponsored by the Portland Gem and Mineral Show Association

List of Speakers for event include:

- 1 Dick Pugh, Cascade Meteorite Laboratory, Portland Public Schools Geology Teacher and Lecturer
- 2 Scott Burns, PhD, Portland State University
- 3 Ian Madin, PhD, Oregon Department of Geology and Mineral Industries
- 4 Rick Thompson, Ice Age Floods Institute, lecturer and author.

This program will be held from 8-12 a.m. on Saturday September 30, 2006, as part of the Portland Regional Gem and Mineral Show. The symposium will be at the Portland Metropolitan Expo Center located at 2060 N. Marine Drive. For advanced registration contact Keene Clay at 503-558-8500 or by email at odroc@comcast.net. Space for the symposium is limited.

The 27th Portland Regional Gem and Mineral Show has moved to the Expo center and will have a more dealers, demonstrators, displays and many exciting activities for children. The show runs from Friday and Saturday (10-6) and Sunday (10-5).

There will be a guided bus tour of many of the features discussed in the Symposium, the following Saturday Oct. 7, 2006.

For more information, contact Keene Clay at 503-558-8500 or Taylor Hunt at 503-662-4790, e-mail: taylor_hunt@comcast.net.

Oregon's Earth Science Week Meeting

Oregon geoscientists and other friends are kicking off the first annual Earth Science Week this October 8 – 14th. The Oregon Department of Geology and Mineral Industries (DOGAMI), the Association of Engineering Geologists (AEG) Oregon Section, and others plan to co-host ESW educational activities to occur on the second week in October every year. Oregon has captivating geology with picturesque volcanoes, massive flood basalts, the scenic Columbia River Gorge carved by glacial floods, an offshore subduction zone, too many landslides and much more exciting geology.

ESW Tool Kit(s) will be used by speakers to supplement their first-hand geology experiences in classrooms and community organizations.

These Kits have been supplied by the American Geological Institute (AGI) and supplemented with materials by DOGAMI, Oregon State University and the USGS Cascade Volcano Observatory in Vancouver, WA. For more information, check out www.earthsciweek.org

If you have questions, please contact Drew Harvey (503-417-7693; andrew_harvey@pbsenv.com), Bill Burns or Yumei Wang, DOGAMI ESW coordinators (oregongeology.com).

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NOVEMBER ACTIVITIES

Friday Evening Talk, November 17, 8:00 p.m., Dan Dzurisin, U.S. Geological Survey, Cascade Volcano Observatory, will give a talk describing current USGS monitoring activities of the Cascade Volcanoes. Location: Room S17, Cramer Hall, Portland State University, 1721 SW Broadway, between Montgomery and Mill. (Room S17 is on the sub-basement level of Cramer Hall, directly below the Geology Department's main office.) **Note change of date of the November Friday evening talk. Because PSU will be closed for a holiday on the date of the usual GSOC Friday evening talk, the date of the talk has been moved to the third Friday evening of the month—for November only.**

Seminar, Wednesday evening, November 15, 8 p.m. Topic of the seminar led by Tara Schoffstall will be "Rivers Made Easy." The seminar will be an activity-based lesson on some river processes. Location: Room 69, Cramer Hall, Portland State University. As usual, all are welcome!

PARKING AT PORTLAND STATE UNIVERSITY IS FREE AFTER 7 P.M. IN THE PARKING STRUCTURE ON BROADWAY DIRECTLY ACROSS FROM CRAMER HALL

DETAILS ON UPCOMING GSOC EVENTS

GSOC Seminar Announcement

Seminars will be coming back soon, and I am looking for ideas. If you have any suggestions, please e-mail Tara Schoffstall at tschoffstall@yahoo.com. Thanks!

Date for November Friday evening talk changed

Because Portland State University will be closed for a holiday on the second Friday of November when GSOC would normally have its Friday evening talk, we have to move the Friday evening talk to the third Friday night of the month (November 17)—for this month only. So plan to attend on **November 17** to hear an interesting talk by Dan Dzurisin, a USGS research scientist and expert on volcano monitoring and volcano hazards from USGS Cascade Volcano Observatory.

BOARD MEETING NOTES

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

October 14, 2006

The meeting was called to order by President Bonnie Prange at the home of Rosemary Kenney. Board and GSOC members present included Bonnie Prange, Richard Bartels, Beverly Vogt, Charlie Carter, Janet Rasmussen, Larry Purchase, Rosemary Kenney, Tara Schoffstall, Clay Kelleher, and John Newhouse.

The Field Trip report was given by Bev, who reported that 79 people took part in the **three successful one-day field trips**. Next year, we will probably have two longer trips, one to southwest Oregon and one to eastern Washington and Oregon. There will also be at least one one-day local trip. We will also organize a fossil hunting trip to the coast next February.

There will be no Field Trip chairman next year unless someone volunteers. It was decided that each leader should decide the maximum number he/she wants on his/her trip, and that **people should pre-register**. That means the meeting place is not announced in the calendar or the newspaper—participants find out when they call in or email in to pre-register.

It was decided that the organization should purchase a portable speaker to be used for field trips and possibly programs as well. Board members are to research costs.

Bonnie led a discussion about preparing **promotional material** to be used at a display table for next year's Ice Age Floods meeting—plus other places. We need a large sign plus some kind of portable DVD projector.

Miscellaneous old/new business: We will have no more name tags, but we are all **encouraged to be friendly** to new attendees. Because the last meeting attracted too many people for the room, we need to know what to do to have more room for popular programs.

Next board meeting is scheduled for 10:00 a.m., December 9, at Rosemary's house.

Bev Vogt, Secretary

Geological Evolution of the Columbia River System

Editor's Note: This article is a compilation of information based on the topics presented in the Friday, October 13, 2006, GSOC lecture, with speaker Terry Tolan of Groundwater Solutions, Inc., Kennewick, Washington, information presented in the lecture and the accompanying slide show, Bev's own knowledge of the topics, and the references listed below.

by Beverly Vogt

Over the last 17 million years, the course of the Columbia River was influenced by (1) eruption of flood basalts of the Columbia River Basalt Group (CRBG), (2) Cascade Arc volcanism, and (3) regional deformation. During this time, the location of the ancestral Columbia River channel changed significantly, shifting back and forth across the Columbia Plateau and establishing at least four different channels through the Cascades via the Columbia Trans-Arc Lowland. The CRBG flows were erupted between 17 and 6 million years ago from long linear vents in eastern Oregon, eastern Washington, and western Idaho, flowing downhill in a westerly direction, crossing the Columbia Plateau and passing through the Columbia Trans-Arc Lowland—with some flows even reaching the Pacific Ocean. In his lecture, Tolan summarized the history of the CRBG and showed how these flood-basalt flows either affected the location of the Columbia River or documented the river's location at a specific time in geologic history.

The Grande Ronde flows, which were produced by numerous eruptions between 16.5 and 15.5 million years ago, were by far the most voluminous flows of the CRBG, making up about 85% of their total volume. Flow after flow destroyed existing drainage systems, making it necessary for new drainage systems to be developed to carry the water and sediments of the ancestral Columbia River that drained eastern Washington, eastern Oregon, northern Idaho, British Columbia, and western Montana.

A 100,000- to 300,000-year-long lull in CRBG volcanism called the Vantage time occurred about 15.5 million years ago. During this time, the ancestral Columbia River developed a channel that followed the Mount Hood syncline, passing under Mount Hood, continuing on to the Salem and Amity area, going through the Coast Range, and eventually reaching the coast at the Cape Foulweather/Lincoln City area. The location of this channel is known because following Vantage time, a new cycle of CRBG volcanism began, producing flows called Wanapum Basalt—and one of the flows called the Ginkgo flow of the Frenchman Springs Member of Wanapum Basalt filled and destroyed this channel, thereby preserving its location but also forcing the ancestral Columbia River to create a new channel.

CRBG volcanism continued, and approximately 14.5 million years ago, the course of the ancestral Columbia River is known to have shifted to the north, where it flowed through a series of interconnected shallow lakes on the Columbia Plateau and then through the Bull-Run Mosier syncline. Its location was preserved by the Rosalia flow of the Priest Rapids Member of Wanapum Basalt that flowed across the Plateau, into a lake located at The Dalles, through the Hood River Valley and Bull Run Watershed, and finally to its last known location—Crown Point, where it can be seen today on the south side of the present-day Columbia River. The Priest Rapids flow completely filled and then overflowed the Priest Rapids channel, forcing the river to develop another new channel farther to the north.

Following Wanapum Basalt time, the ancestral Columbia River established a new path across the Columbia Plateau and the Columbia Trans-Arc, flowing in the first Yakima Fold syncline north of the Bull Run-Mosier syncline. The final phase of CRBG volcanism called Saddle Mountains Basalt began about 13.5 million years ago, and continued intermittently until about 6 million years ago. Changes in the location and character of the ancestral Columbia River during this time can be determined by the nature and composition of sediments and portions of CRBG flows found within its channel. About 13 million years ago, the Huntzinger flow of the Asotin Member of Saddle

Mountains Basalt flowed through this channel of the ancestral Columbia River into western Oregon. Then about 12 million years ago, the Pomona Member of Saddle Mountains Basalt also flowed through the channel, marking its location but not filling it—so the ancestral Columbia River continued to flow through it, depositing sediments called the Troutdale Formation that reflect the changing geology and drainage patterns of both the source areas and nearby surroundings. The Pomona Member channel of the ancestral Columbia River is visible today at Mitchell Point and Bridal Veil Falls in the Gorge on the Oregon side of the Columbia River and at river's edge near Cape Horn on the Washington side of the Columbia River—as well as farther to the west.

Between 11.5 and 10.5 million years ago, Cascade Arc dacitic-andesitic volcanism began, causing debris flows and lahars of the Rhododendron Formation to flow into The Dalles-Mosier area and into the Pomona channel of the ancestral Columbia River, sometimes probably temporarily damming the river. Between 10 and 8 million years ago, the eastern portion of the ancestral Columbia River began to shift southeast across the Yakima Valley-Klickitat Valley toward the Pasco Basin. Between 8 and 5 million years ago, the ancestral Columbia was captured by the ancestral Salmon-Clearwater River in the Wallula Gap area. Dacitic and andesitic Cascade volcanism stopped about 7 to 6 million years ago.

About 5 million years ago, Cascadian and Boring-type high-alumina basaltic volcanism began in the Columbia Trans-Arc Lowland, sending basalt flows and hyaloclastic debris into the Pomona channel until it filled up, forcing the river to shift northward to its present-day location. The change in source and character of sediments is well documented in the Troutdale Formation deposits in the Gorge and Portland/Vancouver area. Between 5 and 3 million years ago, the filling of the Pomona channel and subsequent change in stream gradient probably led to the creation of a series of shallow lakes called the Ringold Lakes in the Umatilla Basin, Yakima Valley, Pasco Basin, and north of the Pasco Basin. By 3 million years ago, much of the sediment deposition along the ancestral Columbia had

stopped. Regional uplift of the Cascades, which began around 2 million years ago, stopped the deposition of the Troutdale Formation and caused the incision of the Columbia Gorge by the present-day Columbia River.

Clearly the history of the Columbia River and its various channels and tributaries is a complex and fascinating story. This summary only starts to tell the story. Terry Tolan has given GSOC a CD of the graphics he used in his presentation. Watch for information in future newsletters on how to get a copy of the CD. A huge amount of information about the CRBG has been published in refereed science and geologic journals, by the USGS, by various universities, and by various other state and federal agencies. For more information about the Columbia River Basalt Group, the history of the Columbia River, regional geology, and geologic maps, start with the following references and websites:

Publications:

- Reidel, S.P., and Hooper, P.R., 1989, Volcanism and tectonism in the Columbia River flood-deposit province: Geological Society of America Special Paper 239, 386 p.
- Tolan, T.L., Beeson, M.H., and Vogt, B.F., 1984, Exploring the Neogene history of the Columbia River: Discussion and geologic field trip to the Columbia River Gorge: Oregon Department of Geology and Mineral Industries, Oregon Geology, v. 46, no. 8 and 9 (August and September), p. 87-113.

Websites:

- CRBG mapping and urban hazards:
http://or.water.usgs.gov/projs_dir/crbg/
- USGS Pacific NW geologic mapping:
<http://geomaps.wr.usgs.gov/pacnw/index.html>

On the Beach: A Writing Weekend with Ellen Morris Bishop

Thomas R. Owen

“On the Beach” would have been a good subtitle to a writing workshop “Finding the Landscape’s Voice” given by Ellen Morris Bishop over the weekend of July 15-16. The actual subtitle was “Using geology, time and landscapes to craft and enrich story.” The class was offered through Portland State University’s Haystack Summer Program in the Arts. Classroom work was done at the Cannon Beach Elementary School. The inspirational work was done during forays on the beach with Bishop’s guided observations and rich background development. The students included four teachers, one electrical utility manager, a graduate student interested in science writing, a retired nursing professor, and this author.

Bishop led off with the position that “Geology is the science that has the most story.” She proceeded to demonstrate it, from this participant’s view, to a spectacular degree. A major theme on the first day was to focus on the sand as something seemingly ordinary that can have many levels (scales) of description. Seen from a distance sand has certain color and texture whereas up close the grains have different colors and a profound story to tell. She described research done by Paul Komar of Oregon State University showing that a lot (at least a significant minority) of Oregon beach sand came from the Klamath Mountains! Some of what you see and what you feel between your toes came in the first place from the southern Oregon Klamath Mountains and drifted up (to the north) beach via the coastal plane.

During the last segment of Saturday’s session, Bishop drew a map on the whiteboard and presented her story of the geologic history of Oregon starting about 100 million years before present. It began before the Cascade Mountains and the Coast Range with a blue shoreline drawn through the middle of

the state and mention of off-shore sea mounts to the west. A major focus of this history was to motivate the Sunday trip to Haystack Rock. To show the locations and timing of the far NE Oregon vents that led to the mega-massive Columbia River Basalt flows and to the astonishing origin of Haystack Rock.

Sunday morning we met on the beach at the base of Haystack Rock. Bishop described the sill structure where the Columbia River Basalt mass forced its way under and through the sea floor sediments sometimes changing angle and sometimes ballooning or pouching up through weaknesses producing structures that one participant called an aneurism. She pointed out the jumbled sedimentary/igneous structures that resulted. Finally she asked the group to appreciate the fine detail of Haystack through trying to draw it. (My drawing seems to have gotten the jumbled part right.) It is doubtless apparent to geologists, but maybe not to casual visitors, that the Rock is not altogether a basaltic monolith. Sedimentary material occurs at the base and a couple of places part way up.

Over and above (literally) Haystack Rock, holocene birds presented themselves as a kind of condiment to the geoscape. Cormorants, gulls, pelicans and tufted puffins were on continual display, as if by command, going to, from and circling the Rock. Gull chicks were visible through binoculars.

Another beach expedition followed lunch, this time to outcrops south of Tolovana. Here at the base of the shore side outcrop, was a compressed example, a précis, of the sill structure of the Haystack Rock area. A basalt sill of human proportions, a two to three foot thick sill separating soft Astoria formation sandstone. Immediately above and below the basalt was a 2-3 inch band of dark hard baked sandstone – the contact zone which experienced the full heat of the molten basalt intrusion. Again, jumbled igneous/ sedimentary structures were present. Here looking at outcrops slightly off shore, one can see that the sill bent upward and thickened. In the shore wall was a layer of pea sized conglomerate which would be an easy locality for a statistical composition study.

Nearby two boulders protruded from the beach both of them begging for story. One was a conglomerate where a sandstone matrix held potato to cantaloupe sized sedimentary cobbles – obviously sedimentary because they were layered! We discussed the possible origin of such a pattern. The other boulder, made of fine grey sandstone, sparkled with flecks of mica. Bishop said that the mica indicated a Klamath Mountain origin.

Over the two days there were discussions about tsunamis, Bretz floods and colors of green. We had short timed writing assignments to the stems “The water” and “On the beach” and a paragraph describing something to 3 levels of scale (I chose European sea grass – blade, bunch and beach full). We learned Bishop’s favorite words and concepts, some of which are oolite, recumbent, Eocene, archaen, graben, energy ebb/flow, and geologic time scale. We met Bishop’s two dogs Meesha and Dundee one of which is on the cover of her latest book “Best Hikes with Dogs”. We discussed four books listed below. The books by McPhee would be particularly interesting to those with a geology bent.

To close, we returned to the classroom for a little more writing, a little more elaboration on the whiteboard geologic history map, sharing of our story ideas, learning about Bishop’s educational activities with Oregon Paleo Project and then adios.

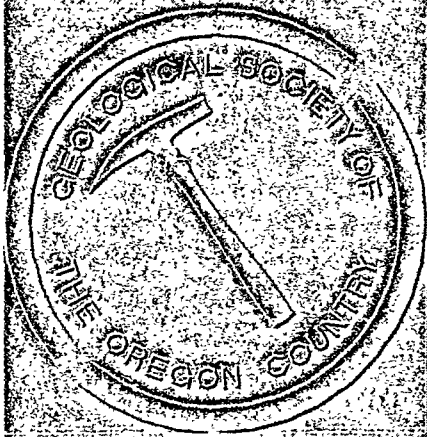
Reading List:

- Gloss, Molly, “Jump-Off Creek”, Houghton Mifflin, Boston, 1989
McPhee, John “Rising from the Plains”, Farrar Straus Giroux, New York, 1986
McPhee, John “Basin and Range”, Farrar, Straus Giroux, New York, 1980
Williams, Terry Tempest, “Refuge”, Vintage Books, New York, 1991

Tom Owen is a relatively new GSOC member. He has a couple of degrees in psychology and a Ph.D. in education and is semi-retired as an educational statistician and program evaluator. His interest in geology goes back to his middle school years in upstate New York hunting fossils in the shale stream cuts not far from Thomas Condon’s early stomping grounds. He dug fossils with Lon Hancock in the summer of 1960. And he got to spend two days in July sitting at the instructional feet of Ellen Morris Bishop!

**GEOLOGICAL SOCIETY OF
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ACTIVITIES:

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

FIELD TRIPS: About 6 per year. Fees: see field trip announcements on the calendar next page.

GEOLOGY SEMINAR: Usually held on the third Wednesday of some winter months, 8:00 p.m., Rm. S17, Cramer Hall, PSU. See calendar for details

GSOC LIBRARY: Rm. S7, Open 7:30 p.m. prior to meetings.

PROGRAMS: Second Friday evening most months, 8:00 p.m., Rm. S17, Cramer Hall, PSU, SW Broadway at SW Mill St., Portland, Oregon.

MEMBERSHIP: Per year from January 1: Individual--\$20.00, Family--\$30.00, Junior (under 18)/Student--\$10.00.

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VOL. 72, NO. 12
DECEMBER, 2006

Bonnie Prange, President, 360-693-8396, bonnie@eco-land.com
Acting Calendar Editor, Beverly Vogt, 503-292-6939, bevvoigt@comcast.net

DECEMBER ACTIVITIES

Friday Evening Talk, December 8, 8:00 p.m., Richard Bartels, GSOC Vice President, will speak on "The Geologic History of the Black Hills, South Dakota." Location: Room S17, Cramer Hall, Portland State University, 1721 SW Broadway, between Montgomery and Mill. (Room S17 is on the sub-basement level of Cramer Hall, directly below the Geology Department's main office.)

Because of the holidays, there will be no Wednesday night seminar in December.

FUTURE EVENTS

Friday Evening Talk, January 12, 2007, 8:00 p.m., Ken Cameron, Oregon Department of Environmental Quality, will speak on "It's Not Nice to Fool Mother Nature: Man-Made Structures and Jokuhlaups at White River Glacier, Mount Hood, Oregon."

Seminar, Wednesday evening, January 17, 2007, 8-10 p.m. Topic of the seminar led by Richard Bartels and Tara Schoffstall will be "A Hike Down the Kaibab Trail, Grand Canyon, Arizona." Become familiar with the stratigraphy and arid-region landforms of the Grand Canyon. The activity for the last part of the evening is an exercise to convert a topographic map into a geologic map.

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DETAILS ON UPCOMING GSOC EVENTS

GSOC Seminar Announcement

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UPDATE ON MOUNT ST. HELENS

Synopsis of Friday, November 17, 2006, GSOC Meeting with speaker Dan Dzurisin, USGS Cascades Volcano Observatory by Carol S. Hasenberg

Last month's GSOC speaker Dan Dzurisin, who has been with the USGS Cascades Volcano Observatory (CVO) since 1981 specializing in volcano geodesy, started the presentation by stating that the current eruption of Mount St. Helens is the best kept secret in the Northwest. "It's erupting tonight", he said. In fact, the present eruption has proceeded continuously since October 2004 (see "It's Alive!" in the November 2004 Geological Newsletter) and has provided scientists at the CVO valuable information about volcanic eruptions.

The recent history of volcanic eruptions at Mount St. Helens includes a continuous eruption sequence from 1800 to 1857, after which the volcano became dormant until the violent blast of May 1980, then episodic dome-building eruptions from 1980 to 1986, and the present steady eruption from October 2004 to the present. Dzurisin noted that the CVO scientists are very fortunate indeed to have had two eruption sequences occur within a short time span, affording an opportunity to study the eruptions within the span of their careers.

Dzurisin provided some contrasts for the GSOC audience between the eruptions of the 1980's and the 2000's. Dome building in the 1980's was

episodic. The current eruption acts more like a toothpaste tube extruding lava at a steady rate, although the rate has slowed to less than half of the original October 2004 rate. The lava in the current eruption contains less gas and is cooler in temperature (900 rather than 950 degrees Celsius) than the lava in the 1980's eruptions.

One of the most interesting phenomena of the current eruption is the extrusion of recumbent spines or "whalebacks" from the magma underneath. These are completely solidified when they come from the ground. Dzurisin showed some time-lapse sequences of photos taken inside the crater showing whalebacks emerging from the ground at a rate of about one meter per day. The photos show the whalebacks shoving the crater glacier out of the way and eventually collapsing. The sides of the whaleback are covered with about a meter of pulverized dacite – even the crystals are broken. The pulverized rock, called fault gouge, forms as the spine grinds past the walls of a conduit extending downward to a magma reservoir.

Another source of interest in the current eruption is the interaction between the growing dome and the glacier in the crater. The glacier in the crater at Mount St. Helens is one of the few glaciers in the world that have been growing since the 1980's. This came about as a result of the newly made crater from the 1980 blast with a high south rim to shade it continuously. The glacier that formed was about 400 feet deep in the area of the new dome prior to the current eruption. The rate of melt of the glacier has been surprisingly low. In fact, the glacier is not melting now, it's being shoved out of the way of the enlarging dome. The fault gouge material of the current volcanic extrusion and the still air in the crater are both good insulators, and the porous nature of crater fill material allows easy infiltration of any meltwater that forms. As a result, there has been no measurable increase in discharge from the streams coming out of the crater during the current eruption.

Of course, the current eruption gives scientists unique monitoring opportunities to gather information about the volcano. USGS uses instrument emplacements and overflights to monitor

the activities on Mount St. Helens and the other Cascades volcanoes. Currently five cameras are emplaced in the crater. Pictures from these cameras were used to get the time lapse images Dzurisin showed GSOC and pictures which may be viewed on the CVO website. In addition to cameras, USGS has emplaced seismic sensors, GPS units, and other instruments in instrument boxes with legs which they have dubbed "spiders". One type of spider is called a MARV lander, because it resembles Martian landers and was designed by CVO staff member Marvin Couchman. There have been more than 1 million earthquakes since the eruption began in 2004. Earthquake monitoring can give scientists valuable information about the movement of magma within the volcano, and is a key component of warning for imminent eruptions.

Monitoring networks are established in and around the volcano with these and other instruments, such as strain meters and tilt meters. These networks make it possible to maintain constant vigilance on Mount St. Helens, other volcanoes, and other natural hazard sites such as major earthquake faults. They can also trigger satellite monitoring when significant events occur on these sites, increasing the ability of scientists to assess, warn the public, and study catastrophic natural events as they occur.

USGS scientists also use FLIR, or infrared cameras, which can measure the temperature of the lava at the surface. That's how the scientists knew that the lava in the current eruption was fresh from the magma chamber, and not lava from the 1980's. The first spine which extruded was at a temperature of 775 degrees Celsius.

Another promising monitoring technique from satellites, InSAR, or radar interferometry, can monitor land deformations around volcanoes with accuracy in the range of centimeters. This technique makes it possible to map volcanic deformations around the world and monitor the movement of magma. The ultimate goal in volcanic monitoring is to more effectively mitigate volcanic hazards.

A question asked at the lecture was whether a blast such as the May 1980 eruption is likely in the near

future. Dzurisin answered by saying that the changed shape of the volcano as a result of the 1980 avalanche makes another avalanche and laterally directed eruption unlikely. Also, one characteristic of this eruption is a surprisingly small amount of gases released into the atmosphere. It is similar in amount to magma that has been able to equilibrate its pressure at a depth of about 9-10 km prior to eruption. This, combined with the fact that the area around the volcano has been subsiding leads scientists to think that a large explosive eruption in the near future is unlikely.

In the remarks made at the end of the lecture, Dzurisin noted that the lava of Mount St. Helens is primarily dacite in composition (refer to the Igneous Rock Properties Table on page 57). St. Helens is historically a "prodigious producer" of dacite domes. Dzurisin also feels that the current eruption could possibly go on for a long period of time. The previous eruption before the 1980 eruption lasted for 57 years between 1800 and 1857.

Accompanying Web References:

USGS CVO Website:

Mount St. Helens, Washington Eruption 2004 to Current main page:

<http://vulcan.wr.usgs.gov/Volcanoes/MSH/Eruption04/framework.html>

Graphic of the crater and its current contents as of July of 2006 from the *Eruption Highlights* page:

[http://vulcan.wr.usgs.gov/Images/Jpg/MSH/MSH06/MSH06_pan_from_crater_rim_07-27-](http://vulcan.wr.usgs.gov/Images/Jpg/MSH/MSH06/MSH06_pan_from_crater_rim_07-27-06_annotated_med.jpg)

[06_annotated_med.jpg](http://vulcan.wr.usgs.gov/Images/Jpg/MSH/MSH06/MSH06_pan_from_crater_rim_07-27-06_annotated_med.jpg)

Mount St. Helens, Washington - "Things that go Bump in the Night", January 2005 - Page showing some of the monitoring operations at Mount St.

Helens, including several photos that Dzurisin showed in the lecture:

http://vulcan.wr.usgs.gov/Volcanoes/MSH/Eruption04/Monitoring/things_that_go_bump_jan_05.html

Volcano and Hydrologic Monitoring Techniques, including a description of FLIR and links to Mount St. Helens FLIR photos:

<http://vulcan.wr.usgs.gov/Monitoring/techniques.html>

Wikipedia articles on Mount St. Helens
[http://en.wikipedia.org/wiki/Mount St. Helens](http://en.wikipedia.org/wiki/Mount_St._Helens)
[http://en.wikipedia.org/wiki/2004 and later volcanic activity of Mount St. Helens](http://en.wikipedia.org/wiki/2004_and_later_volcanic_activity_of_Mount_St._Helens)

BULL RUN HYDROELECTRIC PROJECT

The Bull Run Hydroelectric Project is a Portland General Electric development in the Sandy River Basin. The entire project is slated for decommissioning starting in the summer of 2007. The Mount Hood Company began the project in 1906 by building the Little Sandy Dam to divert water from the Little Sandy River through a three mile long wood box flume to Roslyn Lake. The last few miles of the Little Sandy River was effectively eliminated since the entire river was diverted. Roslyn Lake, completed in 1911, was built on a plateau above the Bull Run River and Powerhouse. The lake acts as a forebay for the powerhouse and is used by the community for recreation. The powerhouse was put into operation in 1912 (the same year that the Mount Hood Company was bought by the forerunner of Portland General Electric). In 1913 a second dam was built on the Sandy River. The 47 foot high Marmot Dam supplies the majority of the project's water but uses only a fraction of the Sandy River's normal flow. The Sandy River is on the other side of the Devil's Backbone Ridge. A series of canals and tunnels were required to reach the Little Sandy Dam, where their flows are combined and diverted to the flume and Roslyn Lake. In 1989 the original Marmot Dam was replaced with a concrete structure.

The decommissioning plan will involve the removal of the Marmot Dam during the summer of 2007. The Marmot Dam will be the largest concrete dam ever removed in the United States. The reservoir behind Marmot Dam is filled with approximately 900,000 cubic yards of sand and gravel in a wedge extending a considerable distance upstream. The dam removal will result in a suspension and transport of sediments to a degree that is difficult to predict. Removal of the dam will constitute a potentially large perturbation to the historically sediment rich Sandy River and the fish habitats.

The Little Sandy Dam will be removed in 2008, after which Roslyn Lake will cease to exist. This will restore the Little Sandy River habitat and salmon/steelhead migrations.

Richard Bartels



FIELD GUIDES

If you feel like studying geology at home, or making your own field trip excursions, you can purchase the following GSOC field trip guides from years gone by:

Geologic Trip Log through Eastern Foothills of Oregon Coast Range between Vernonia and Banks, 1964.....	\$0.75
Columbia River Gorge and Grand Canyon of the Deschutes River, 1964	0.75
Geological Guide Book for Central Oregon, Prineville, Paulina, Suplee, Delintment Lake, 1965	0.75
Condon's First Island, Geological Trips in the Siskiyou and along the Rogue River, 1970	1.25
Field Trips along the Oregon Coast in Lincoln County, 1974.....	2.25
Field Guide to Geologic Sites in the Newberry Crater Area, 1976.....	2.00
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Igneous Rock Properties Table

Magma Type	Felsic	Intermediate		Mafic	Ultramafic
Intrusive	<i>Granite*</i>	<i>GranoDiorite</i>	<i>Diorite</i>	<i>Gabbro</i>	<i>Peridotite-Dunite</i>
Extrusive	<i>Rhyolite</i>	<i>Dacite</i>	<i>Andesite</i>	Basalt*	**
Principal Mineral Contents	<i>Quartz Mica Biotite K-Felspar Na-Feldspar</i>	<i>Amphibole Biotite Quartz Na-Feldspar</i>	<i>Amphibole Pyroxene Biotite Ca/Na-Feldspar</i>	<i>Pyroxene Ca-Feldspar</i>	<i>Olivine Pyroxene</i>
Magma Temperature	800-1000°C	1000-1100°C		1100-1200°C	
Magma fluidity*	<i>Highly viscous</i> _____ <i>Very fluid</i>				
Silica Content from USGS by weight	>68%	63-68%	52-63%	48-52%	

*Magma fluidity is a direct result of silica content. Since felsic magma is so sticky, the intrusive form granite is far more common than rhyolite (Oregon being an exception to this rule). Also, fluid mafic magma produces more basalt than the intrusive gabbro.

**Since this magma is produced as a result of fractionation of mafic magma and with the high crystallization temperature of the mineral content, this type of magma is almost always intrusive.

Nominating Committee Results

The following slate of officers has been selected by this year's nominating committee:

President	Richard Bartels
Vice President.....	Janet Rasmussen
Secretary.....	Beverly Vogt
Treasurer.....	Marvel Gillespie
Director, 3 years	Jan Kem
Director, 2 years	Larry Purchase
Director, 1 year.....	John Newhouse
Immediate Past President.....	Bonnie Prange
Past President.....	Charles Carter

Nominations will also be open at the December club meeting on Friday, December 8, 2006. Consent of the nominees must be secured prior to their nomination. Nominations will be closed after the December meeting. Final nominations will be published in the January newsletter. The slate of officers will be voted on and approved at the February monthly meeting.

The Nominating Committee members are Janet Rasmussen, chair; Bonnie Prange; and Richard Bartels. Our thanks to the selected members and members of the Nominating Committee!