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Cover Photo: Elaine Mustoe examines an unusual outcrop of metamorphic rocks uncovered during construction of a logging road in 1988. Located on Blanchard mountain, this outcrop of phyllite, green chert, and milky quartz contains enormous amounts of stilpnomelane, which has crystallized in a bed of Mesozoic chert cut by numerous quartz veins. The contact between metachert and phyllite can be seen at the center of the photo.

Crown Jewel Project and the Pend Oreille Mine—Status Report

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The Crown Jewel Project covers a proposal by Battle Mountain Gold Company to mine by open-pit methods a large gold deposit on Buckhorn Mountain in Okanogan County. Recently some major milestones have been achieved to bring the mine towards production. On December 31, 1998, U.S. District Court of Oregon denied Okanogan Highland Alliance and the Colville Confederated Tribe's motion for a summary judgment. The Crown Jewel Final Environmental Impact Statement and Record of Decision were upheld. Subsequently, pursuant to Section 401 of the federal Clean Water Act, on January 14, 1999, the Washington Department of Ecology has approved a water-quality certification for the Crown Jewel mine. On January 20, 1999, Okanogan Superior Court Judge Burchard dismissed Okanogan Highlands Alliance's lawsuit against Okanogan County, Okanogan County Health District, and Battle Mountain Gold Company. The decision by the Okanogan Health District to defer solid waste permitting, which includes waste rock piles and mine tailings, to other required agency permits was upheld.

From 1906 to 1977, the Pend Oreille mine near Metaline Falls, Pend Oreille County, produced 14,796,305 tons of ore containing 166,985 tons of lead and 345,761 tons of zinc (Lasmanis, 1995). Cominco American, Inc., is proposing to reactivate the mine and mill to develop the Yellowhead ore zone. The Washington Department of Ecology is the lead agency and is in charge of conducting the Environmental Impact Statement (EIS). An environmental consulting firm hired by the Department of Ecology began work in August, 1998. The draft EIS is currently scheduled for completion in late summer, 1999.

Reference

Lasmanis, Raymond, 1995, History of the Metaline mining district and the Pend Oreille mine, Pend Oreille County, Washington: Washington Geology, v. 23, no. 1, p. 24-29. ■

Staff Notes

Kitty Reed, our editor of twelve years, left us in August to pursue personal interests. Kitty has been largely responsible for the high quality of Division publications. We will miss her a great deal and will try our best to maintain her high standards. She is a hard act to follow.

Carl Harris, our Senior Cartographer and GIS Specialist, was promoted to Computer Information Specialist 1 in November and now works for the Department of Natural Resources Information Technology Division sorting out the GIS hydro layer. We will miss Carl not only for his cartographic expertise, but also for his wry wit and willingness to serve as our guru of rock and mineral collecting.

Wendy Dixon-Shelton was hired in December to provide support for the front desk staff. She comes to us through Community Youth Services. We appreciate the work she is doing for us and the opportunity to provide a learning experience for her.

Stilpnomelane at Blanchard Mountain, Western Skagit County, Washington

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Bellingham, WA 98225

Department of Natural Resources (DNR) forest lands in the southern Chuckanut mountains are a popular destination for hikers, horseback riders, and hang gliders, and since 1988, when an unusual outcrop of metamorphic rocks was uncovered during construction of a logging road, geologists and rockhounds as well. Located on Blanchard mountain, this outcrop of phyllite, green chert, and milky quartz contains enormous amounts of stilpnomelane (stilp-NOM-e-lane), a complex hydrous iron aluminosilicate that is usually found only as tiny crystals disseminated in iron-rich host rock. Few mineral enthusiasts have seen stilpnomelane under a microscope, let alone as the fist-size chunks that can be collected at this roadcut (cover photo, Fig 1).

I had the good luck to be the first geologist to visit the Blanchard mountain outcrop, but I was mystified by the sparkling black pea-sized crystal rosettes that comprise a major portion of the bedrock (Fig. 2). Western Washington University geology professor Edwin H. Brown had no difficulty identifying the specimens I collected as stilpnomelane, and it came as no surprise when x-ray diffraction data substantiated his diagnosis because Dr. Brown is one of the world's foremost authorities on this mineral. My own inability to identify the material is ironic, since thirty years ago my first geology-related job was helping construct the experimental apparatus Dr. Brown used in his studies of stilpnomelane geochemistry.

Despite its abundance of attractive mineral specimens, the Blanchard mountain site has received only brief printed mention (Gannaway, 1990). Stilpnomelane from Washington has previously been reported as a constituent of low-grade metamorphic rocks in the North Cascades (Brown, 1971). The mineral is common in rocks of the Shuksan Metamorphic Suite, particularly in the Finney Creek area where bedded magnetite contributed abundant amounts of iron to pore fluids during metamorphism. Despite having a similar chemical composition, Finney Creek stilpnomelane specimens are quite different in appearance from the material at Blanchard mountain (Fig. 3).

GEOLOGIC SETTING

The Chuckanut mountains are best known to geologists as the type locality for the Chuckanut Formation, a thick sequence of Early Tertiary arkosic sedimentary rock that underlies the northern part of the range. The southern Chuckanut region contains quite different bedrock—regionally metamorphosed Mesozoic marine sediments that have been tectonically transported from a distant location. The geology of this area is shown in Figure 4. Much of the bedrock is phyllite and fine-grained schist ('semischist') that belongs to the Shuksan Metamorphic Suite, an assemblage that originated when ancient ocean-floor sediments were subducted beneath the western edge of North America during the late Mesozoic. Elsewhere in the northwestern Cascades, the Shuksan Suite includes mafic schist that was produced by metamorphism of mid-ocean ridge basalt flows, but this rock type is absent in the Chuckanut region.

The southern Chuckanut mountains also contain other metamorphosed igneous rocks that have long puzzled geologists. These rocks form scenic outcrops at Windy Point, Pigeon Point, Bat caves, and Oyster dome. Gallagher and others (1988) believed that these meta-igneous materials represent pre-metamorphic compositional variations within the Shuksan Suite, but Whetten and others (1980) and Dragovich and others (1998) suggested they are remnants of some other thrust plate.

Stilpnomelane occurs within a zone of steeply dipping green chert that contains a complex pattern of hydrothermally deposited quartz veins. The chert unit is enclosed within a large body of phyllite. The vein-bearing zone is 150 m wide, with an exposed height of approximately 3 m. Stilpnomelane is particularly abundant in chert near the margins of quartz veins, and the crystalline veinlets and rosettes extend into the host rock for distances that vary from a few millimeters to 5 cm or

Figure 1. The stilpnomelane-bearing outcrop on the south flank of Blanchard mountain. *(See cover for a close-up view.)*

Figure 2. Rosettes of black stilpnomelane are abundant in chert bordering small veins of milky quartz.

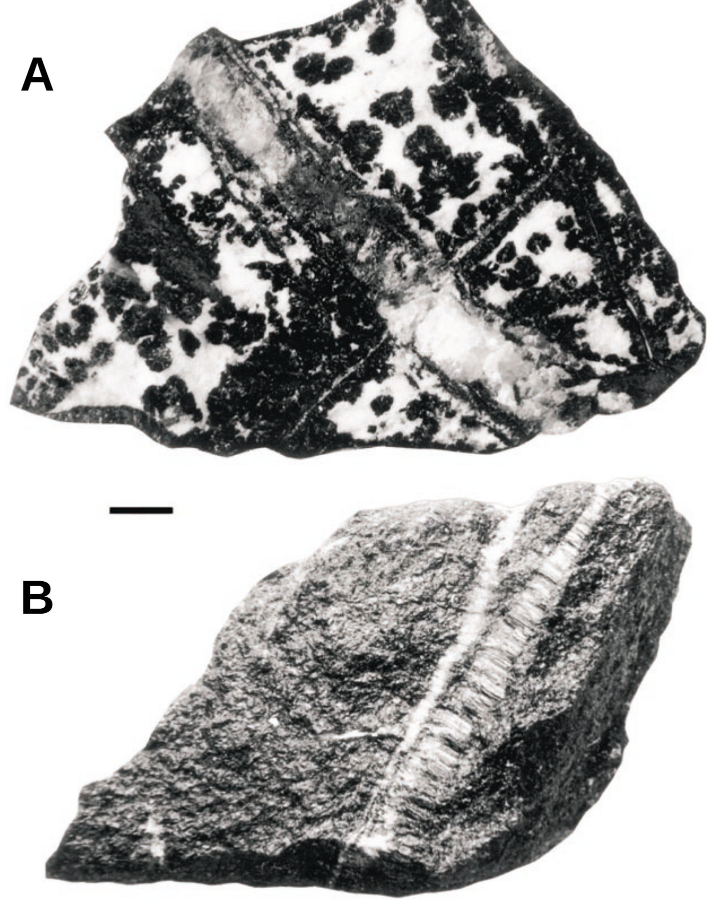

Figure 3. A. Specimen from Blanchard mountain. Milky vein quartz contains stilpnomelane, but the mineral is not present in a 1 cm wide vein of translucent gray quartz. Cross-cutting relationships indicate that the gray vein post-dated stilpnomelane mineralization. **B.** Schist from Finney Creek contains stilpnomelane in two forms—veinlets composed of platy crystals and smaller crystal aggregates scattered throughout the surrounding matrix. Scale bar = 1 cm.

more. Stilpnomelane is also present as disseminated crystalline aggregates within small milky quartz veins; veins wider than a few centimeters contain little or no stilpnomelane.

MINERALOGY

Stilpnomelane was first described by Glocker (1827). The mineral has a layered crystal structure similar to that of talc or mica, being composed of a sheet of oxygen (O^{-2}) and hydroxyl (OH^-) ions and water molecules sandwiched between two silicate layers rich in iron and containing lesser amounts of aluminum (Eggleton, 1970, 1972; Deer and others, 1974). Individual triclinic crystals are seldom recognizable in hand specimens, and stilpnomelane typically appears as dark-colored micaceous flakes that are easily mistaken for biotite or chlorite.

Stilpnomelane characteristically forms stacks of thin plate-like crystals that are oriented radially at low angles of inclination around a central axis to produce an aggregate whose shape resembles a rose blossom that has been pressed between the pages of a book. In thin section, these masses are commonly visible as radiating clusters of needles or as bow-tie shaped sheaves. Both of these images are edge-on views of the sheet-like crystals (Fig. 5). The actual crystal arrangement is more accurately seen when uncut specimens are examined using a scanning electron microscope (Fig. 6).

The most important diagnostic characteristic is cleavage. The basal cleavage of stilpnomelane is less perfect than that of biotite or chlorite, yielding flakes that are brittle rather than elastic. Stilpnomelane may also be recognized by the presence of a weaker cleavage direction perpendicular to the basal plane. The optical properties of stilpnomelane are similar to those of biotite, with one important exception: stilpnomelane does not show the mottled extinction pattern that is observed in biotite. X-ray diffraction provides a reliable method of identification because the mineral produces a distinctive major peak near 12Å (Fig. 7). The position of this peak remains unchanged when the sample is treated with ethylene glycol or glycerin, in contrast to clay minerals that have 12Å lattice spacings (Chauvel, 1973).

CHEMICAL COMPOSITION

Stilpnomelane has a variable chemical composition that lies between two end members. Ferrostilpnomelane has an ideal formula of $K_5Fe^{2+}_{48}(Si_{63}Al_9)O_{168}(OH)_{216}\bullet 12H_2O$. The ideal chemical formula of the ferric end member is $K_5Fe^{3+}_{48}(Si_{63}Al_9)O_{216}\bullet 36H_2O$ (Eggleton and Chappell, 1978). Samples of both types also contain small amounts of sodium, calcium, and manganese.

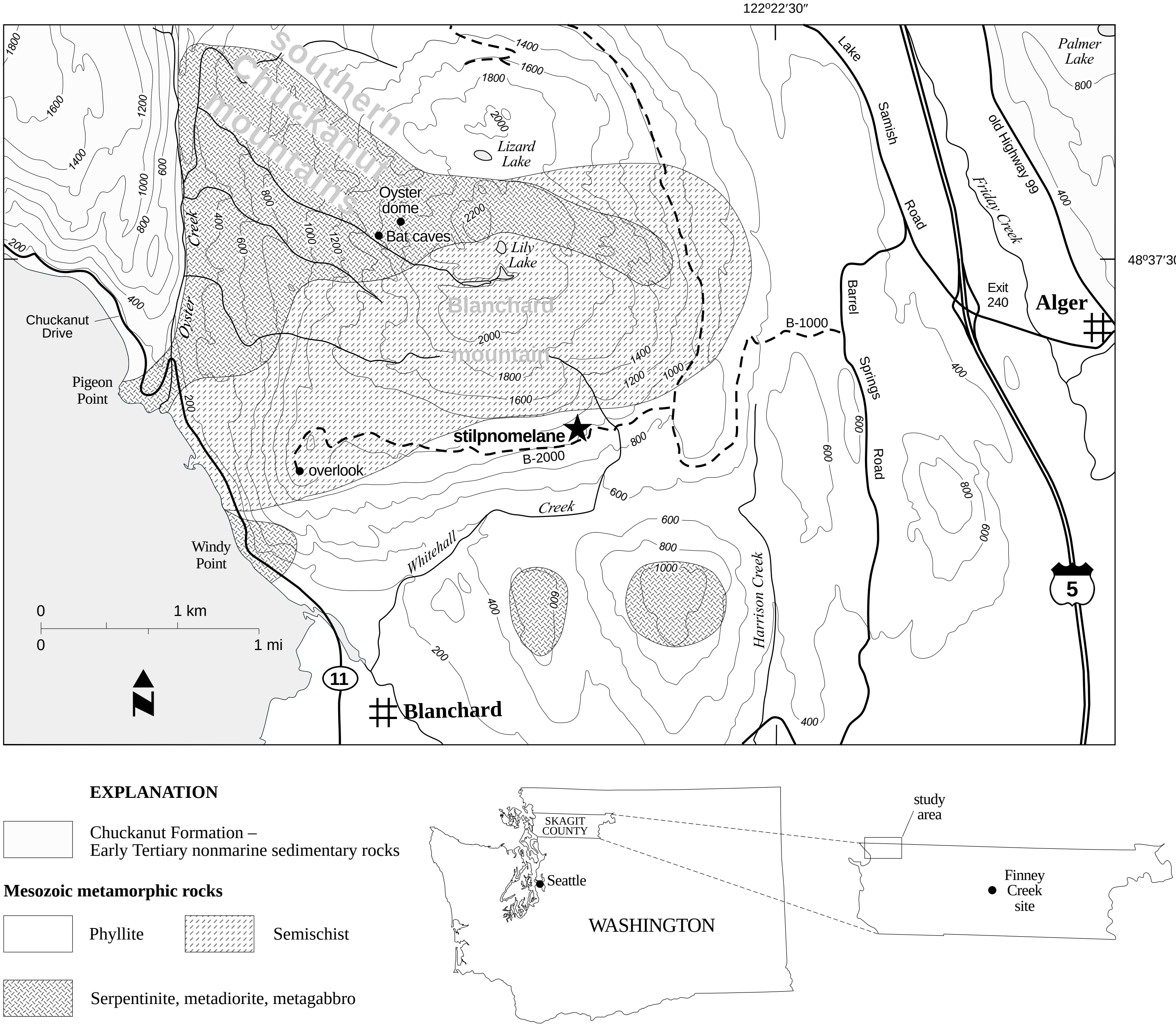

Figure 4. Bedrock map of the southern Chuckanut mountains region based on mapping by Gallagher and others (1988).

Hutton (1938) applied the stilpnomelane name only to the ferric variety and referred to the oxidized form as ferri-stilpnomelane. Brown (1971) used ‘green stilpnomelane’ and ‘brown stilpnomelane’ to describe the ferrous and ferric varieties, but color is not always a reliable indicator of iron oxidation state. Ferrous stilpnomelane is typically olive green to pale green, but specimens that have a very low magnesium content may be brown. Oxidation typically causes green-colored stilpnomelane to become dark brown or reddish brown, but at Blanchard mountain and a few other locations, ferric stilpnomelane is an intense black. Chauvel (1973) suggested using the names ferrostilpnomelane and ferristilpnomelane. The stilpnomelane family also includes several varieties that contain large amounts of manganese substituted for part of the iron: ekmanite (Jakob, 1923), parsettensite (Deer and others, 1973; Guggenheim and Eggleton, 1994), and franklinphilite (Dunn and others, 1992).

The pure ferric and ferrous end members do not occur in nature, and individual specimens have compositions that lie somewhere between these extremes. Hashimoto (1969) observed that specimens tend to fall into either of two clusters based on their ferric/ferrous ratio. This bimodal distribution reflects the petrogenesis of stilpnomelane, where relatively pure ferrostilpnomelane may later become almost completely oxidized to ferristilpnomelane. This alteration trend is visible in thin section where green stilpnomelane grains are surrounded by brown rims (Hutton, 1938). Under laboratory conditions, Brown (1971) was able to reverse this reaction, producing green ferrostilpnomelane by heating brown ferristilpnomelane at 400 to 500°C for 27 days under pressures of 3,000 to 4,000 atmospheres.

The average chemical compositions of stilpnomelane from Blanchard mountain and Finney Creek are shown in Table 1. Water content is not reported for these samples because the

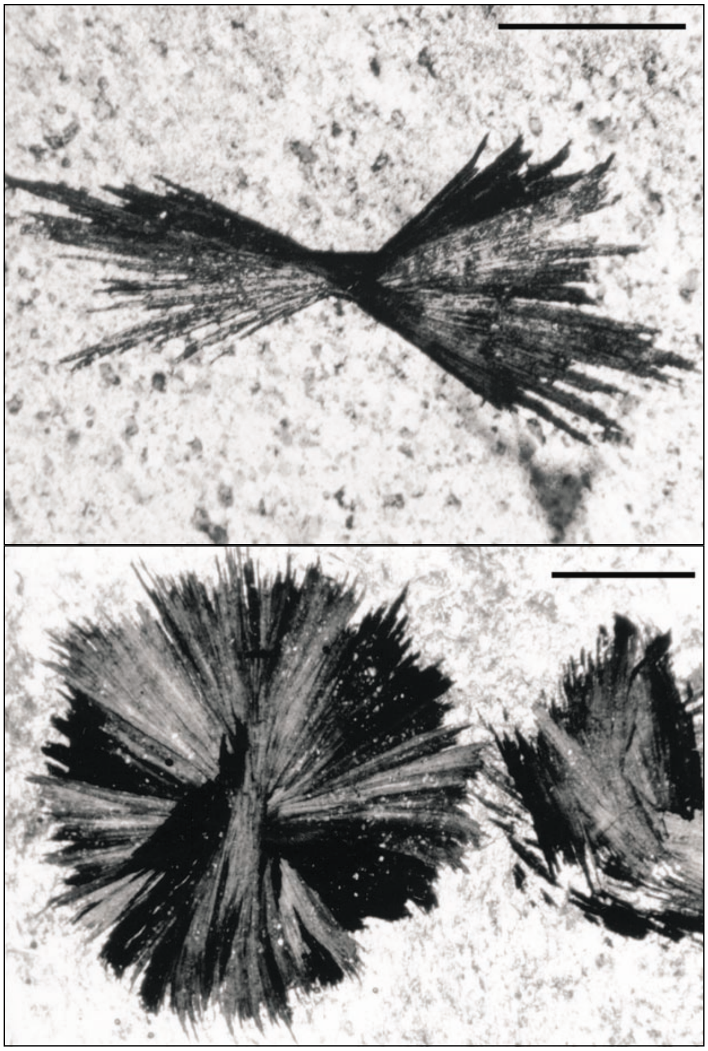

Figure 5. In thin section, stilpnomelane deceptively appears to consist of radial aggregates of needle-like crystals. Tiny clear zones within the radiating crystals are quartz inclusions. These Blanchard mountain specimens also show the fine microcrystalline structure of the chert matrix. Scale bars = 1 mm.

900°C temperature required for dehydration may cause the sample weight to change as a result of iron oxidation. Investigators have used special techniques to measure the iron content of stilpnomelanes from other locations, typically reporting H_2O^+ values of 5 to 9 percent (Chauvel, 1973).

The 49.57 percent SiO_2 content measured for the Blanchard mountain samples is somewhat greater than the 44 to 45 percent values that have been reported for most other stilpnomelanes. The Blanchard samples analyzed by the atomic absorption method probably have been contaminated by small amounts of quartz, visible in thin sections as tiny inclusions within the stilpnomelane crystals (Fig. 5). The 44.3 percent SiO_2 value that Dr. Foord obtained by electron microprobe analysis is closer to the 45.65 percent value determined by atomic absorption analysis for the quartz-free Finney Creek sample. For other elements, the Skagit County stilpnomelanes all fall within the compositional ranges that have previously been reported (Grüner, 1937; Hutton, 1945, 1956; Brown, 1971; Chauvel, 1973; Deer and others, 1974; Eggleton and Chappell, 1978).

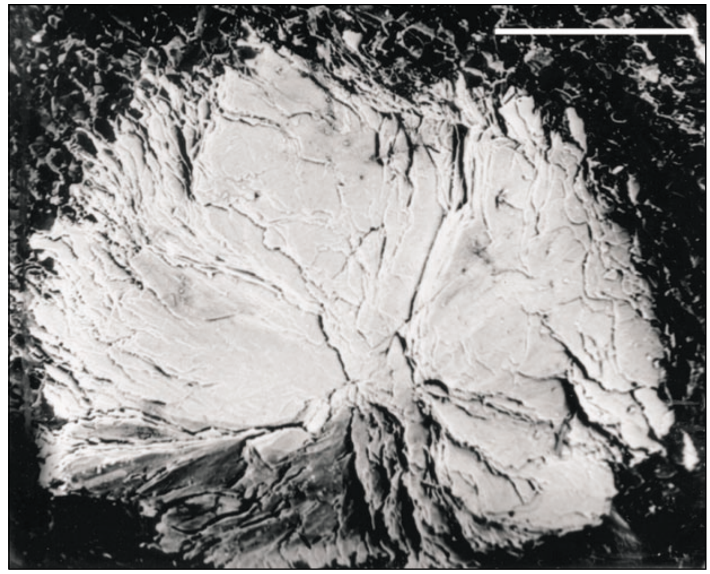

Figure 6. This photo from a scanning electron microscope (SEM) of the broken surface of a Blanchard mountain specimen shows that stilpnomelane rosettes actually consist of flat plates that are inclined around a central axis. Although this is an accurate representation of the mineral's three-dimensional architecture, the SEM produces a black and white image based on electron emission that may be quite different from the specimen's appearance under visible light. In this example, the black stilpnomelane appears to be a light-colored mineral, and the quartz matrix is nearly black. This photograph demonstrates the SEM's great depth of field, allowing sharp focus even on a very irregular surface. Back-scattered electron image photographed using a Model 120 Cambridge Stereoscan electron microscope. Scale bar = 1 mm.

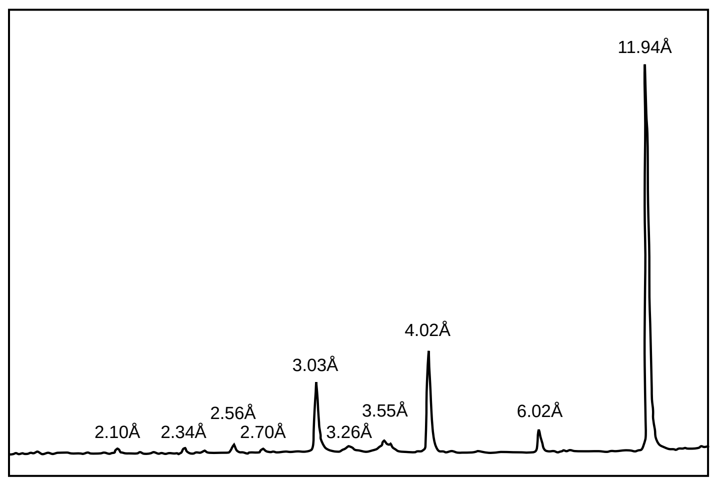

Figure 7. X-ray diffraction pattern obtained from Blanchard mountain stilpnomelane using Cu Kα radiation on a Rigaku Geigerflex diffractometer with graphite crystal monochromator. Finney Creek stilpnomelane yields a nearly identical x-ray pattern.

ORIGIN

Stilpnomelane is most commonly found in iron-rich rocks that have experienced greenschist- or blueschist-facies metamorphism as a result of exposure to relatively moderate temperatures and pressures. This mechanism accounts for the presence of the mineral in the North Cascades, the Franciscan Complex of the northern California Coast Range, in schist at Otago, New Zealand, and at numerous other sites around the world (Turner and Hutton, 1935). At Blanchard mountain, stilpnomelane

Table 1. Chemical analyses of Blanchard mountain and Finney Creek stilpnomelane. ND, no data

% oxide	Blanchard mtn.[1] (average of 3 analyses)	Blanchard mtn.[2] (average of 4 analyses)	Finney Creek[2] (average of 2 analyses)
SiO_2	44.3	49.57	45.65
Al_2O_3	6.25	5.91	7.57
TiO_2	0.0	0.0	0.0
MgO	1.2	1.31	3.99
CaO	ND	0.41	0.20
Na_2O	0.05	0.84	0.02
K_2O	1.2	0.93	1.17
MnO	2.15	2.23	4.36
Total iron as FeO	33.1	28.89	27.46
Total	88.25	90.09	90.42

[1] Electron microprobe data provided by Dr. Eugene Foord, U.S. Geological Survey, Denver, Colo., 1997.

[2] Atomic absorption spectrophotometry performed at Western Washington University using lithium metaborate fusion to dissolve samples.

crystallized during episodes of hydrothermal activity when iron was introduced into the silica-rich host rock by percolating water. The formation of stilpnomelane rather than some other iron mineral reflected physical and chemical conditions that were controlled by regional metamorphism.

Some Precambrian banded-iron formations contain stilpnomelane that formed during later metamorphism of the iron-rich sediment. Examples include the Lake Superior iron deposits of North America (Floran and Papike, 1975), the Hammersley Iron Range of Western Australia, and the Transvaal Supergroup of South Africa (Horstmann and Haelbich, 1995). Stilpnomelane also forms in certain metal sulfide deposits as a result of hydrothermal alteration of magnetite, pyrite, or pyrrhottite (Yui, 1962; Frondel, 1965).

In rare circumstances, ferristilpnomelane is produced by weathering of pyroxene. Eggleton (1975) described an example of this process at a skarn deposit near Canberra, Australia, where hedenbergite weathered to nontronite. This iron-rich variety of yellow smectite clay was in turn altered to brown ferristilpnomelane.

COLLECTING INFORMATION

The cluster of rounded summits east of Samish Bay is shown on maps and trail guides using two conflicting names: Blanchard Mountain and South Chuckanut Mountain. I have chosen to use the former name because it is consistent with the B prefix that the DNR uses to designate logging roads in this area. The stilpnomelane site is located on DNR property in the NW1/4 of sec. 14, T36 N, R3 E, of the Bow 7.5-minute quadrangle. The 1996 Blanchard Hill–South Chuckanut Mountain Trail Map published by the Pacific Northwest Trail Association is an excellent source of information about trails and logging roads (available for $4.95 from PNTA, 1361 Avon Allen Road, Mount Vernon, WA 28373).

To reach the outcrop from I-5, take Alger exit 240 and drive west toward Lake Samish. After 0.7 mi, turn left (south) on Barrel Springs Road and continue 0.9 mi. Turn right on DNR logging road B-1000, marked with a Blanchard Hill Trail sign. Follow this good gravel road for 1.9 mi. Just before reaching the upper trailhead for Lizard and Lily Lakes, turn left on road B-2000. Proceed 0.5 mi to reach the stilpnomelane-bearing outcrop, which is the second rock exposure beyond a culvert that crosses the headwaters of Whitehall Creek. The road continues an additional 2 mi to end at a spectacular viewpoint that overlooks Samish Bay and the San Juan Islands.

Stilpnomelane occurs at many locations in the North Cascade foothills near Finney Peak and Gee Point, south of the Cascade River near the town of Concrete. One site in the Mount Baker–Snoqualmie National Forest is very easy to reach. From Highway 20 just west of Concrete, cross the Skagit River on the Dalles Bridge. Continue east on South Skagit Highway for about 9 mi, then turn south on Forest Road 17 (Finney–Cumberland Road). Follow this road 10.5 mi to reach a large outcrop of thinly bedded siliceous magnetite bordered by dark-colored schist. Stilpnomelane is sparsely present in this schist as mica-like veinlets up to 1 cm in width and more abundant as disseminated microscopic crystals. The main geologic attraction of this site is the rich sedimentary iron ore, considered by early Skagit Valley settlers as a potential bonanza (Shedd and others, 1922; Zapffe, 1945).

ACKNOWLEDGMENTS

Thanks to Seattle mineral collector Robert O. Meyer for generously sharing electron microprobe data from analyses performed in 1997 by USGS mineralogist Eugene Foord. Northwest mineral collectors were saddened by Dr. Foord's death from cancer last year. My wife Elaine Mustoe served as a cheerful field companion and as an astute manuscript editor. E. H. Brown and J. D. Dragovich provided helpful reviews.

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Washington Mutual and SeaFirst Bank Win Project Impact Award

The first Project Impact Summit recognized those people and communities across the nation who have done outstanding work in disaster mitigation during the past year. The winners were announced during an awards banquet December 9 in Washington, D.C. Project Impact is a national initiative launched by the Federal Emergency Management Agency (FEMA) to include individuals, government officials, and business leaders in a partnership to make their communities resistant to disasters.

FEMA Director James Lee Witt said, "The people of every Project Impact community have made a commitment to identify and prioritize disaster risk....These awards are to honor the hard work and dedication of our partners nationwide."

The Model National Corporate Partners Award went to Washington Mutual and SeaFirst Bank/Bank America in Seattle, Wash., for their expanded damage-prevention efforts against the risk of Pacific Northwest earthquakes. Teaming up with insurance companies like SAFECO and PEMCO and building professional associations, they are actively leading the development of a new Home Earthquake Retrofit Program, which is well on its way to retrofitting 2,000 homes.

Project Impact has also published a Hazard Mitigation Guidebook for Northwest Communities—Alaska, Idaho, Oregon, Washington. The guidebook gives practical measures to prepare for disasters such as floods, landslides, earthquakes, tsunamis, wildfires, windstorms, blizzards, and volcanic eruptions. For more information or copies of the guidebook, contact FEMA; Federal Regional Center, Region 10; 130 228th St SW; Bothell, WA 98021-9796; or (425) 487-4678.

Reidel and Gephart Win Fitzner/Eberhardt Award

Steve Reidel and Roy Gephart of Battelle's Applied Geology and Geochemistry Group in Richland, Wash., were recently named recipients of the 1998 Pacific Northwest National Laboratory's Fitzner/Eberhardt Award for Outstanding Contributions to Science and Engineering Education.

Dr. Reidel has mentored many college students at PNNL through the Association of Western Universities Program and is an adjunct professor of geology at Washington State University. Steve also teaches introductory courses in astronomy and geology at Yakima Community College and helps local K-12 teachers improve their knowledge of geology. Steve writes a periodic column in the Tri-City Herald featuring regional geology and gives many public lectures each year to groups ranging from clubs to professional societies to school classrooms. Steve has about 100 publications (articles, maps and abstracts). He was coauthor with Karl Fecht of our Open File Reports 94-8 and 94-13. He also acted as a supplier of geologic data, leader of field trips, and reviewer of texts for our 1:100,000 and 1:250,000 (GM-45) maps of southeastern Washington.

Roy Gephart is a geohydrologist with 25 years' experience in the hazardous waste industry. He frequently works with local and national news media on astronomy, geohydrology, and Hanford waste generation and cleanup and gives science presentations in community forums and to students (elementary through graduate level). Roy formed the Tri-City Astronomy Club and organizes community star gazes. He is a board member of a nonprofit organization renovating the Rattlesnake Mountain Observatory for online student education, teacher training, and research use. Roy has authored more than 50 publications, including textbooks and science-related articles/photographs in national magazines. In 1996, he wrote an award-winning publication on the history of Hanford's high-level radioactive tank waste. He is now working on a new publication summarizing the history of waste generation/release at Hanford and the decision-making challenges of site cleanup.

CD-ROM REVIEW: The Photo-Atlas of Minerals—A comprehensive reference tool for mineral enthusiasts, students, teachers, and professional mineralogists

produced by The Gem & Mineral Council, 1998
Los Angeles County Museum of Natural History
900 Exposition Blvd, Los Angeles, CA 90007
$49.95 plus $5.00 for shipping & handling

The Photo-Atlas of Minerals was developed by Dr. Anthony R. Kampf, curator of Mineral Sciences at the Los Angeles County Museum, and Dr. George Gerhold of Western Washington University. It contains more than 6,500 high-resolution images by well-known mineral photographers, among them Dr. Wendell E. Wilson, Louis Perloff, and Rick Dillhoff of Washington State. More than 6,400 of the images are in color; the others are scanning electron microscope (SEM) photos. The mineral property data were compiled by Lanny Ream.

More than 800 different mineral species are illustrated. Descriptive data on these and thousands of other minerals presents coverage of the entire mineral kingdom. Other features include an audio-based mineral pronunciation guide, a linked glossary of mineral terms, the latest mineral classification scheme according to Strunz, and cross-indexing capabilities for easy searches. System requirements are: a PC 486-33 or better, CD-ROM drive, sound card, Windows 3.1, 95, 98, or NT, a mouse, and for extra sharp images a 24-bit graphics card.

The Pacific Northwest is well represented. For Washington State, 61 mineral species are illustrated from 36 localities. Of these, there are multiple illustrations, such as 31 photos of quartz, 21 of pyrite, and 9 of gold specimens. Oregon is represented by 32 localities with 34 species, mostly zeolites. Milton Speckels is credited with much of the Oregon photography. Idaho is represented by 8 localities and 13 species, including 40 photos of various pyromorphite crystal groups. Montana has 8 localities with 23 species and British Columbia has 8 localities and 14 species.

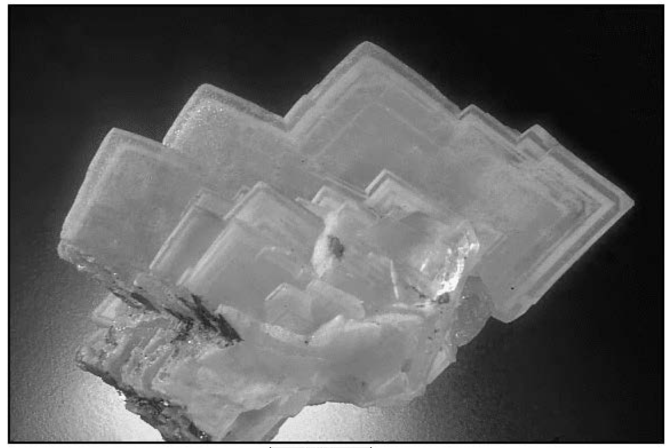
A number of years ago, I was involved in the early planning of this product with Dr. George Gerhold. It is now available and has given me many hours of enjoyment. Being the first of its kind, there are bound to be a few minor glitches, considering the volume of data. For instance, pink zoisite from Tunk Creek, Okanogan County, is mislabeled as coming from Pacific County, and I am still trying to find out where one would find caledonite at Chehalis, Lewis County.

The first release of the Photo-Atlas has sold out. The upgrade (version 1.1) incorporates a number of improvements and fixes most of the glitches in the previous version. My comments on the locations of the pink zoisite and caledonite came too late to make it into this upgrade. Dr. Kampf promises to fix these and any other glitches in the next version and asks that users let them know if anything further turns up.

The most significant enhancements are a much more detailed hierarchical implementation of the Strunz mineral classification system and full implementation of the 'Combine Indexes' feature, making it a more powerful database searching tool. No new minerals or images have been added. Users who purchased version 1.0 may upgrade to version 1.1 for $9.95. Further information regarding the Photo-Atlas of Minerals and an order form are online at the Gem and Mineral Council webpage at http://nhm.org/~gmc.

The Photo-Atlas of Minerals is reasonably priced and comes very highly recommended.

Raymond Lasmanis



1 cm
Barite
Spruce claim, King Co., Washington
Owner: Rick Dillhoff
Photographer: Rick Dillhoff

SEM Photo
Okanoganite on Euxenite
Washington Pass, Okanogan Co., Washington
Owner: Donald Howard
Photographer: Donald Howard

SEM Photo
Zircon
Washington Pass, Okanogan Co., Washington
Owner: Donald Howard
Photographer: Donald Howard

Sample illustrations of minerals from Washington State. The barite photo is in color on the CD-ROM. The other two photos are SEM images. An SEM image is an accurate representation of a mineral's three-dimensional architecture, but since the SEM produces a black and white image based on electron emission, it may be quite different from the specimen's appearance under visible light.

Washington State Gem & Mineral Clubs

The following list of gem and mineral clubs and organizations in Washington State is as up-to-date as we could make it. To make any additions or corrections, contact our front desk by *phone* (360)902-1450, *fax* (360)902-1785, or *e-mail* geology@wadnr.gov.

ABERDEEN

Chehalis Valley Gem Club
422 W 2nd St; Aberdeen, WA 98520
Robert Musgrove, President
Meetings: Second Thursday, 1:00 pm, in members' homes

Grays Harbor Geology & Gem Society
PO Box 2003; Aberdeen, WA 98520
Leonard Airhart (360)533-3078
Vaughn Hamilton, President
Meetings: Third Friday, 7:30 pm, Pearsall Multi-Purpose Center
2109 Summer Ave.; Aberdeen, WA

ARLINGTON

Port Susan Gem & Mineral Club
9406 16th St NE;
Arlington, WA 98223-8904
Meetings: First Wednesday, 12:00 pm,
12015 Marine Dr; Marysville, WA

BELLEVUE

Bellevue Rock Club, Inc.
Box 1851; Bellevue, WA 98009-1851
Elanor Dickson (425)746-8412
Odella Jackson, President
Meetings: First Tuesday, 7:00 pm,
Hyaki School,
445 128th Ave SE; Bellevue, WA

BELLINGHAM

Mt. Baker Rock & Gem Club
PO Box 142; Bellingham, WA 98227
Homer Owens (360)647-6699
Rosemae Bork, President
Meetings: Third Monday, 7:30 pm
Bloedel Donovan Park Pavilion

BREWSTER

Chief Joseph Gem & Mineral Club
PO Box 51; Brewster, WA 98812
Meetings: Second Wednesday, 7:30 pm
Shulls Towing & Wrecking Yard Office

CHELAN

Lake Chelan Rock & Mineral Club
PO Box 487; Manson, WA 98831
Hal Porter (509)687-9615
Charles Leffler, President
Meetings: First Tuesday, 7:00 pm,
Lake Chelan Recl. Dist. Board Room

COLLEGE PLACE

Blue Mountain Gem & Mineral Society
1011 Broadway;
College Place, WA 99324-1571
(509)525-1776
Pearl Vickroy, President
Meetings: Second Thursday, 7:30 pm
Rt 1 Box 114, Walla Walla, WA

EDMONDS

Maplewood Rock & Gem Community Club
PO Box 1295; Edmonds, WA 98133
21318 Pioneer Way; Edmonds, WA 98020
Jeanette Koop (425)771-4687
Marcy Kleckner, President
Meetings: Third Monday, 8:00 pm
Club House, 8802 196th St SW

ELK

Pend Oreille Rock & Gem Club
42503 Regal Rd; Elk, WA 99009
Lois or Bill Hunter (509)292-2485
Bill Hunter, President
Meetings: Third Thursday, 6:30 pm
Fertile Valley Grange

EVERETT

Everett Rock & Gem Club, Inc.
PO Box 1615; Everett, WA 98206
George Burkhart, President (425)672-8952
Fritz Mack, Vice President (425)513-0115
Meetings: Second Monday, 7:30 pm
Our Savior Lutheran Church
215 Mukilteo Blvd; Everett, WA

FEDERAL WAY

Federal Way Gem Club
PO Box 3305;
Federal Way, WA 98063-3305
(253)661-0746
Keith Ray (206)854-1303
Carol Uhlman, President
Meetings: Third Friday, 7:30 pm
Totem Jr. High School Library

FORT LEWIS

Fort Lewis Rock Club
10107 111th St Ct SW; Tacoma, WA 98498
Meetings: First Monday, 7:00 pm
MWR Arts & Crafts Center, Bldg. #5038

KENNEWICK

Lakeside Gem & Mineral Club
PO Box 6652; Kennewick, WA 99336-9998
(509)783-4262/(509)967-3138
Larry Hulstrom, President
Meetings: First Wednesday, 7:00 pm
First Savings Bank of Washington,
203 W 1st Ave

Rockateers Gem & Mineral Club (Junior Club)
PO Box 6652; Kennewick, WA 99336
Meetings: Second Tuesday, 6:30 pm
First Savings Bank of Washington,
basement, 203 W 1st Ave

LANGLEY

Whidbey Pebble Pushers
PO Box 279; Langley, WA 98260
Gen Richards (360)221-2637
Charles Bash, President
Meetings: First Wednesday, 7:00 pm
4-H Club Bldg, Island Co. Fairgrounds

LONGVIEW

Southern Washington Mineralogical Society
PO Box 704; Longview, WA 98632-7451
Emmet Johnson, President (360)636-3491
Meetings: Fourth Saturday, 7:00 pm
Catlin Grange Hall;
207 Shawnee St N, Kelso, WA

MARYSVILLE

Marysville Rock & Gem Club, Inc.
4406 92nd St NE; Marysville,
WA 98270-2506
Lloyd Bellman (360)659-2554
Ed Lehman (206)334-6282
Dale Sanders, President
Meetings: Second Tuesday, 7:30 pm
Jennings Park Barn

MOUNT VERNON

Northwest Rockies Family 4-H Club (Junior Club)
6131 Dale Way; Lynnwood, WA 98036
(253)856-1564/(206)776-6598
Aaron Bever, President
Meetings: Second Monday, 7:00 pm
Upstairs Skagit Co. Fair Office

Skagit Rock & Gem Club
PO Box 244; Mount Vernon, WA 98273
Dave Britten (360)755-0741
Meetings: First Wednesday, 7:30 pm
IBEW Hall; 706 W Division

OAK HARBOR

Whidbey Island Gem Club
PO Box 224; Oak Harbor, WA 98277
W. H. Schreiter (360)678-5485
Keith Ludeman, President
Meetings: Second Wednesday, 7:00 pm
Oak Harbor Senior Center

OLYMPIA

Washington Agate & Mineral Society
PO Box 2553; Olympia, WA 98507
M. J. Huetter (360)459-8121
Curtis Mack, President
Meetings: First Tuesday, 7:00 pm
First Baptist Church; 22nd & College, Lacey

PORT ANGELES

Clallam County Gem & Mineral Society
PO Box 2624; Sequim, WA 98382
John Schuy, President
Meetings: Third Wednesday, 7:00
Sequim Senior Center
921 E Hammond St, Sequim, WA

PORT ORCHARD

Kitsap Mineral & Gem Society
PO Box 3462; Silverdale, WA 98383
(360)697-1859
Jim McClure (253)265-3011
Mark Stephens, President
Meetings: Second Friday, 7:30 pm
Chico Alliance Church Gym,
3670 Chico Way; Bremerton, WA
e-mail: pogy2@worldnet.alt.net

PORT TOWNSEND

Port Townsend Rock Club
8275 Hwy 20; Port Townsend, WA 98368
Marie Anderson (360)385-0420
Janet Smith, President
Meetings: Last Monday, 7:30 pm
Jefferson County Fairgrounds

PUYALLUP

Puyallup Valley Gem & Mineral Club
PO Box 134; Puyallup, WA 98371-0014
Steve Dugan (206)531-2484
Gene Beckstead (253)535-6536
Ralph Graves, President
Meetings: Second & Fourth Friday, 7:30 pm
Fruitland Grange Hall,
112th St E & 87 Ave E

REDMOND

East Kingco Rock Club, Inc.
PO Box 2203; Redmond, WA 98073-2203
Jack Frasl (206)820-0244
Jack Donner, President
Meetings: Fourth Monday, 7:30 pm;
(Juniors 7:00 pm)
Rose Hill Presbyterian Church
Fellowship Hall

SEATTLE

Boeing Employees Mineralogical Society
The Boeing Co., Box 3707 MS-8L-35;
Seattle, WA 98124-2207
Lee Adams, President (206)235-1338
Meetings: Second Thursday, 7:30 pm
Boeing Activities Center, Rm B
22649 83rd Ave S, Kent, WA

Issaquah Valley Rock Club, Inc.
1706 NW 59th, #303; Issaquah, WA 98107
(206)789-0588
Mike S. Tanaka, President (425)392-7858
Meetings: Last Friday, 7:30 pm
Issaquah Community Center
180 E Sunset Way

North Seattle Lapidary & Mineral Club, Inc.
(206)524-5188
Susan Gardner (206)782-6522
Harold Cutton, President
Meetings: Second Tuesday, 8:00 pm
(Juniors 7:00)
Northminster Presbyterian Church
7706 25th Ave NW, basement of church

Seattle Faceting Club
Leonard Bahr (206)242-5560
Norman Steele, President
Meetings: Fourth Tuesday, 7:30 pm,
in members' homes

*South Seattle & Des Moines
Gem & Mineral Club*
13056 24th Ave. S; Seattle, WA 98168
Bill Scott, President
Meetings: Third Thursday, 7:00 pm
Tukwila Senior Center, 4101 S 131st St

West Seattle Rock Club
PO Box 16145; Seattle, WA 98116
Paul Schoeler (206)932-1522
Meetings: Fourth Wednesday, 7:30 pm
(Except July and December;
November, Third Wednesday)
Adams Hall,
Tibbetts United Methodist Church,
3940 41st St SW, Seattle, WA
e-mail: tobycoz@aol.com

SHELTON

Shelton Rock & Mineral Society
PO Box 242; Shelton, WA 98584
(360)427-0387
Bill Barron, President
Meetings: Last Thursday, 7:00 pm
Mason Count PUD #3 Bldg., 307 W Cota

SNOHOMISH

Snohomish Lapidary Club
9108 105th Ave SE;
Lake Stevens, WA 98258-8919
Don Brown (360)659-6444
Glenn Morita (425)337-0385
Larry Soderblom, President
Meetings: First Monday, 7:30 pm
Snohomish Public Library, First & Cedar
e-mail: gmorita@seanet.com

SPOKANE

Columbia Geological Society, Inc.
W 1517 Carlisle Ave;
Spokane, WA 99205-3511
(509)328-6584
Jean Williams, President
Meetings: First Thursday, 7:30 pm
(except July, August, and December)
Manito Garden Center, Manito Park

Rock Rollers Club, Inc.
OPP Station, PO Box 14766;
Spokane, WA 99214-0766
Mable Rutherford (509)926-6851
Ed Brandstoettner (509)467-0360
Leon Agee, President
Meetings: Fourth Saturday, 7:30 pm
East Spokane Grange Hall; N 1621 Park Rd.

TACOMA

Tacoma Faceters Guild
5109 Point Fosdick Dr NW;
Gig Harbor, WA 98335
Meetings: Fourth Monday, 7:00 pm
Fircrest Community Center,
555 Contra Costa; Tacoma, WA

TENINO

Tenino Rock Cruisers
Box 4008; Tenino, WA 98589
Ken Hedden, President 264-2570
Meetings: Second Wednesday, 7:00 pm
(except August and December)
Tenino Masonic Hall, 260 W Sussex

TUKWILA

Northwest Opal Association
Meetings: Second Wednesday
(except July and August)
Tukwila Denny's; 5700 Southcenter Blvd
(north side of I-405)

WALLA WALLA

*Marcus Whitman Gem &
Mineral Society, Inc.*
PO Box 338;
Walla Walla, WA 99362-0009
(509)529-3673
Jack Edwards, President
Meetings: Second Tuesday, 7:30 pm
Lions Park Field House,
Larch St, College Place

WASHOUGAL

Washougal Gem Club, Inc.
938 17th St; Washougal, WA 98671-1510
Dolphe S. Gilbreath, President
Meetings: Fourth Tuesday, 2:00 pm
(except July & August), 938 17th St.

WENATCHEE

Gingko Mineral Society
PO Box 303; Wenatchee, WA 98807
Claude Johnston (509)884-3188
Mike Edgett, President
Meetings: Second & Fourth Friday, 7:30 pm
Memorial Hall; 215 Okanogan Ave

WOODINVILLE

Maplewood Rock & Gem Club
20718 59th Ave SE;
Woodinville, WA 98072
Bud Lischke (206)365-5312
Meetings: Third Monday
8802 196th St SW, Edmonds, WA

YAKIMA

Yakima Gem & Mineral Club
PO Box 969; Yakima, WA 98907
Andy Beeman (509)457-6339
Bill Snell (509)837-5329
Jack Friedt, President
Meetings: Third Friday, 7:30 pm
Central Lutheran Church;
16th & Yakima Ave

YELM

Nisqually Valley Rockhounds Society
PO Box 561; Yelm, WA 98597
(206)491-1429
Tim Howard, President
Meetings: Second Thursday, 7:30 pm
Yelm High School Art Room

STATE AND NATIONAL

Northwest Federation of Mineralogical Societies (NFMS)
4401 SW Hill St; Seattle, WA 98116
(206)937-7872
Dorothy Lee, President

Northwest Micro Mineral Study Group (NWMMSG)
Donald G. Howard
356 SE 44th Ave
Portland, OR 97215

Friends of Minerology, Inc.
Pacific Northwest Chapter
Bob Mayer, President (425)641-0723
John Cornish (360)457-7630
16239 NE 18th St; Bellevue, WA 98008

Washington State Mineral Council
Bob O'Brien, President
1665 S Elger Bay Rd;
Stanwood, WA 98292

Selected Additions to the Library of the Division of Geology and Earth Resources

August 1998 through January 1999

THESES

Bacon, D. H., 1997, Residence time of labile carbon in the vadose zone: Washington State University Doctor of Philosophy thesis, 256 p.

Christenson, D. H., 1997, Hydrology of urban watersheds in Cheney, Washington with an emphasis on stormwater runoff and water quality: Eastern Washington University Master of Science thesis, 139 p.

Fiedorowicz, B. K., 1997, Geologic evidence of historic and prehistoric tsunami inundation at Seaside, Oregon: Portland State University Master of Science thesis, 197 p.

García, A. F., 1996, Active tectonic deformation and late Pleistocene and Holocene geomorphic and soil profile evolution in the Dosewallips River drainage basin, Olympic Mountains, western Washington State: University of New Mexico Master of Science thesis, 152 p., 4 plates.

Kirn, S. L., 1995, Petrology of a Mount Rainier pyroclastic eruption: Brown University Bachelor of Science thesis, 1 v.

Martin, W. J., 1996, Integration of risk analysis and sorption studies in the subsurface transport of aqueous carbon-14 at the Hanford site: Washington State University Doctor of Philosophy thesis, 201 p.

Includes:

Martin, W. J.; Whelan, Gene; Conca, J. L., 1996, Integration of sorption and risk assessment in waste disposal. p. 30-50.

Martin, W. J.; Whelan, Gene, 1996, Modeling of radioactive transport from decommissioned nuclear reactor waste. p. 6-29.

Massong, T. M., 1998, Influence of lithology, sediment supply, and log jams on the distribution of bedrock and alluvial channels: University of Washington Master of Science thesis, 62 p.

Matthews, J. M., 1996, The stratigraphy and sedimentology of the Eocene O'Brien Creek Formation, Okanogan Highlands, north-east Washington, USA: Washington State University Doctor of Philosophy thesis, 182 p.

McArdell, B. W., 1997, Field experiments on the controls of downstream fining in gravel-bed rivers: Johns Hopkins University Doctor of Philosophy thesis, 137 p.

McNeill, L. C., 1998, Structure and seismic hazards of the offshore Cascadia forearc and evolution of the Neogene forearc basin: Oregon State University Doctor of Philosophy thesis, 178 p., 1 plate.

Includes:

McNeill, L. C.; Goldfinger, Chris; Hummon, Cheryl, 1998, Neotectonic map of the Washington and northwest Oregon continental margin. 1 plate.

Meng, Xiangying, 1997, Radiolarian biostratigraphy of the Upper Jurassic of San Pedro del Gallo terrane, north-central Mexico, and the Lower Cretaceous of Nooksack Group, Nooksack terrane, northwestern Washington: University of Texas at Dallas Doctor of Philosophy thesis, 351 p.

Olson, P. L., 1995, Shallow subsurface flow systems in a montane terrace–floodplain landscape—Sauk River, North Cascades, Washington: University of Washington Doctor of Philosophy thesis, 277 p.

Payne, C. W., 1998, Lithofacies, stratigraphy, and geology of the middle Eocene type Cowlitz Formation and associated volcanic and sedimentary units, eastern Willapa Hills, southwest Washington: Oregon State University Master of Science thesis, 253 p., 3 plates.

Phillips, W. M., 1997, Applications of noble gas cosmogenic nuclides to geomorphology: University of Arizona Doctor of Philosophy thesis, 256 p.

Silva de Echols, Catarina, 1995, Epibionts and their effects on the taphonomy of Recent crinoid ossicles, Friday Harbor, Washington, and San Salvador, Bahamas: Auburn University Master of Science thesis, 161 p.

Wills, M. T., 1998, Dairy farming and the effects of agricultural, nonpoint-source pollution on stream water quality, Johnson Creek watershed, Whatcom County, Washington: Western Washington University Master of Science thesis, 282 p.

U.S. GEOLOGICAL SURVEY

Published Reports

Page, R. A.; Basham, P. W., 1985, Earthquake hazards in the offshore environment: U.S. Geological Survey Bulletin 1630, 69 p.

Solley, W. B.; Pierce, R. R.; Perlman, H. A., 1998, Estimated use of water in the United States in 1995: U.S. Geological Survey Circular 1200, 71 p.

Thompson, R. S.; Hostetler, S. W.; Bartlein, P. J.; Anderson, K. H., 1998, A strategy for assessing potential future changes in climate, hydrology, and vegetation in the western United States: U.S. Geological Survey Circular 1153, 20 p.

Todd, V. R., 1995, Geologic map of the Doe Mountain 15′ quadrangle, Okanogan County, Washington: U.S. Geological Survey Miscellaneous Field Studies Map 2306, 1 sheet, scale 1:62,500, with 17 p. text.

U.S. Geological Survey, 1998, Mineral industry surveys—Washington: U.S. Geological Survey, 7 p.

Fact Sheets, Open-File, and Water-Resources Investigations Reports

Derkey, P. D.; Johnson, B. R.; Lackaff, B. B.; Derkey, R. E., 1998, Digital geologic map of the Rosalia 1:100,000 quadrangle, Washington and Idaho—A digital database for the 1990 S. Z. Waggoner map: U.S. Geological Survey Open-File Report 98-357, 27 p.

Drost, B. W.; Turney, G. L.; Dion, N. P.; Jones, M. A., 1998, Hydrology and quality of ground water in northern Thurston County, Washington: U.S. Geological Survey Water-Resources Investigations Report 92-4109 (revised), 230 p., 6 plates.

Embrey, S. S., 1991, Available habitat for salmon and steelhead trout in the lower Puyallup, White, and Carbon Rivers in western Washington: U.S. Geological Survey Water-Resources Investigations Report 89-4125, 62 p.

Finn, C. A.; Brenner, K. C.; McCafferty, Anne; Kucks, R., 1998, Washington aeromagnetic maps and data: U.S. Geological Survey Open-File Report 98-241, 1 v. [downloaded 9/30/98 from http://greenwood.cr.usgs.gov/pub/open-file-reports/ofr-98-0241/wash.html]

Harp, E. L.; Chleborad, A. F.; Schuster, R. L.; Cannon, S. H.; Reid, M. E.; Wilson, R. C., 1998, Landslides and landslide hazards in Washington State due to February 5–9, 1996 storm: U.S. Geological Survey Administrative Report, 1 v. [downloaded 9/25/98 from http://geohazards.cr.usgs.gov/html_files/nlic/Wash_hrp/wash1.htm]

Hoblitt, R. P.; Walder, J. S.; Driedger, C. L.; Scott, K. M.; Pringle, P. T.; Vallance, J. W., 1998, Volcano hazards from Mount Rainier, Washington, revised 1998: U.S. Geological Survey Open-File Report 98-428, 11 p., 2 plates.

Inkpen, E. L.; Embrey, S. S., 1998, Nutrient transport in the major rivers and streams of the Puget Sound basin, Washington: U.S. Geological Survey Fact Sheet 009-98, 4 p.

Johnson, B. R.; Derkey, P. D.; Frost, T. P.; Derkey, R. E.; Lackaff, B. B., 1998, Digital geologic map of Spokane County and vicinity, Washington and Idaho: U.S. Geological Survey Open-File Report 98-503, 42 p.

Kahle, S. C., 1998, Hydrogeology of Naval Submarine Base Bangor and vicinity, Kitsap County, Washington: U.S. Geological Survey Water-Resources Investigations Report 97-4060, 107 p., 7 plates.

Kresch, D. L., 1998, Determination of upstream boundaries on western Washington streams and rivers under the requirements of the Shoreline Management Act of 1971: U.S. Geological Survey Water-Resources Investigations Report 96-4208, 57 p., 4 plates.

Kresch, D. L., 1998, Determination of upstream boundary points on northeastern Washington streams and rivers under the requirements of the Shoreline Management Act of 1971: U.S. Geological Survey Water-Resources Investigations Report 98-4160, 19 p.

LaHusen, R. G., 1998, Detecting debris flows using ground vibrations: U.S. Geological Survey Fact Sheet 236-96, 2 p.

Mastin, M. C., 1998, Flood potential of South Prairie Creek, Pierce County, Washington: U.S. Geological Survey Water-Resources Investigations Report 98-4009, 75 p.

Melick, Roger; Furman, T. L.; Langer, W. H.; van Brenk, H., 1998, Using geographic information systems with specific examples for the aggregate industry: U.S. Geological Survey Open-File Report 98-39, 1 v. [downloaded from http://minerals.cr.usgs.gov/publications/ofr/98-39/report-.htm]

Scott, K. M.; Wolfe, E. W.; Driedger, C. L., 1998, Mount Rainier—Living with perilous beauty: U.S. Geological Survey Open File Report 98-428, Fact Sheet 065-97, 4 p.

Soller, D. R., editor, 1998, Digital mapping techniques '98—Workshop proceedings: U.S. Geological Survey Open-File Report 98-487, 134 p.

Sumioka, S. S., 1998, A survey of ground-water quality in the Toppenish Creek Basin, Yakama Indian Reservation, Washington, 1989–91: U.S. Geological Survey Water-Resources Investigations Report 97-4194, 89 p., 5 plates.

U.S. Geological Survey, 1996, Annual project summaries—Volume 37, Pacific Northwest: U.S. Geological Survey, 115 p. [reports downloaded Dec. 2, 1998, from http://erp-web.er.usgs.gov/reports/VOL37/pn_vol37.htm]

Includes:

Atkinson, G. M.; Boore, D. M., 1996, Ground motion relations for the Pacific Northwest. p. 1-2.

Atwater, B. F., 1996, Prehistoric earthquakes in western Washington. p. 3-4.

Brocher, T. M., 1998, Analysis of wide-angle seismic data from Cape Blanco, Oregon. p. 22-24.

Carpenter, J. E., 1996, Workshops to explain the changes resulting from seismic rezone from UBC Zone 2B to Zone 3 in southwest Washington State. p. 15-17.

Creager, K. C.; Malone, S. D., 1996, Broad-band array analysis of the Puget Sound region. p. 18-20.

Crosson, R. S., 1996, Earthquake hazard research in the Pacific Northwest using Washington Regional Seismograph Network data. p. 21-24.

Dadisman, S. V.; Johnson, S. Y.; Childs, J. R., 1996, Neotectonics of the northern Puget Lowland and eastern Straits of Juan de Fuca, Washington. p. 25.

Doser, D. I., 1998, Source processes of crustal earthquakes and their relation to the tectonics of southern Alaska. p. 55-57.

Endo, E. T.; Dzurisin, Daniel; Iwatsubo, E. Y., 1996, Physical processes in large silicic magma systems. p. 35-36.

Fleming, S. W.; Trehu, A. M., 1996, Configuration of the subduction zone backstop and its influence on forearc deformation—Constraints from modeling gravity and magnetic anomalies. p. 99-109.

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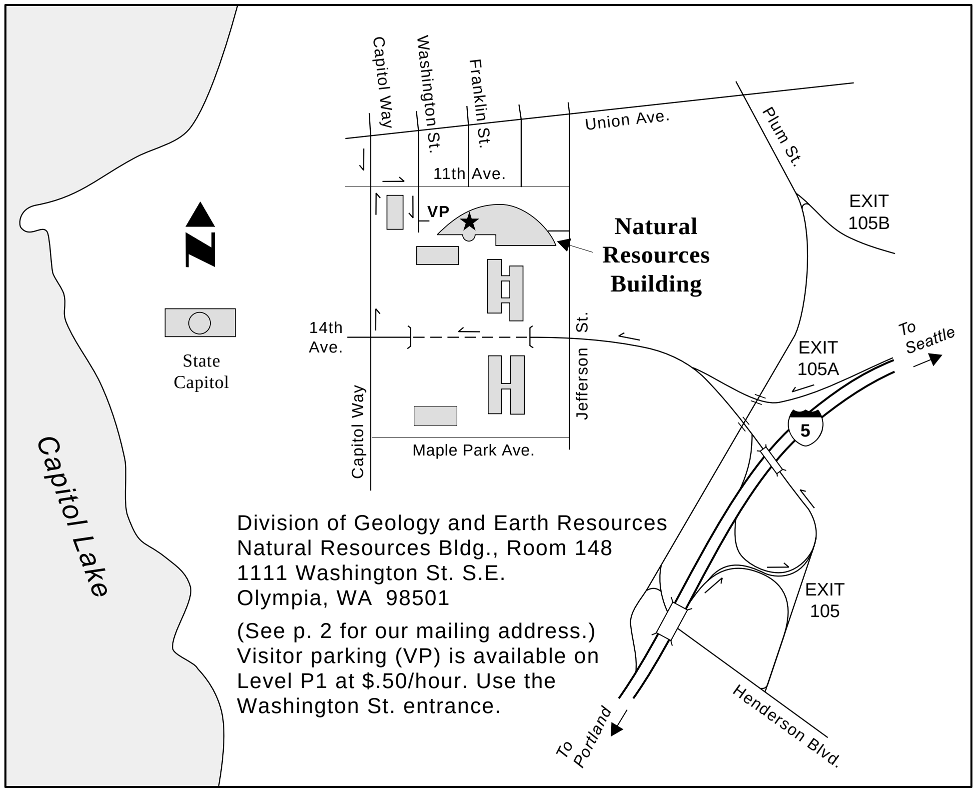

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Washington Bibliography Available on CD-ROM

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DIVISION PUBLICATIONS

New Releases

Quaternary Stratigraphy, Cross Sections, and General Geohydrologic Potential of the Bow and Alger 7.5-minute Quadrangles, Western Skagit County, Washington, Open File Report 98-8, by Joe D. Dragovich and Carly L. Grisamer. This report with 30 p. text and 6 plates is based on interpretations of numerous well logs. $5.56 + .44 tax = $6.00.

Geologic and Geophysical Mapping of Washington, 1984 through 1999, and Theses on the Geology of Washington, 1986 through 1998, Open File Report 99-1, compiled by C. J. Manson. 55 pages, 9 plates. Listed are 264 geologic or geophysical maps and 508 theses. This report supersedes (by updating) Open File Report 98-1. $1.39 + .11 = $1.50.

1999 Gold and Fish—Rules and Regulations for Mineral Prospecting and Placer Mining in Washington State has just come in. It will be available free of charge.

Orders must be prepaid. Make check or money order payable to the Department of Natural Resources. Taxes apply to Washington residents only. Please include $1.00 for postage and handling of orders to be sent by mail.

Northwest Geological Society Website

The Northwest Geological Society now has a website at http://www.scn.org/tech/nwgs/. Much of the information on the website is not specifically about NWGS—it focuses on Northwest geology in general. Editor/webmaster Dave Knoblach is trying to improve communication between NW geoscientists and geology-related organizations. “Since the website went on line in September 1998, I have found several organizations previously unknown to me from Vancouver, B.C., to Portland to Spokane. I am now in regular communication with most of them. The site has received attention from the Tri-Cities, Ellensburg, Moses Lake, and Walla Walla, judging from the e-mail I have received and links that I have found to our site from other organizations. A number of non-NWGS organizations and individuals have started to contribute to the NWGS website,” he said.

The NWGS website contains a robust calendar page from many organizations in the northwest, geology link pages, and links to government and educational agencies, weather, employment, and professional organizations. It also contains announcements focused mainly on Washington geology and the NWGS. ■

APOLOGIES TO OUR READERS

Due to loss of staff and an increased work load, *Washington Geology* has been behind schedule for most of the last year. We hope to be back on track soon, although we may have to cut back on the size and (or) frequency of the issues. Thank you for your patience.

Weldon Rau Honored

Weldon W. Rau, Division of Geology and Earth Resource geologist emeritus, has been honored with a mention in *Oregon Fossils* (Orr and Orr, in press). “Weldon Rau, who performed much of the biostratigraphic micropaleontology work in the Pacific Northwest from the middle 1960s onward, enjoyed a reputation as a rapid but careful worker. Born in Tacoma in 1921, Rau completed his graduate education at the University of Iowa where he earned a Ph.D. in paleontology in 1950. Taking a job as a micropaleontologist and stratigrapher with the Fuels Branch of the U.S. Geological Survey that same year, he specialized in benthic (bottom-dwelling) Tertiary foraminifera of the Pacific Northwest. Several extensive monographs on the Olympic Peninsula in addition to descriptions of many isolated faunas and local geology were the result. Two of his most interesting bulletins are on the scenic geology and history of the Washington coast (Rau, 1973, 1980)....Weldon joined the Washington Division of Geology and Earth Resources in 1960 and since retirement continues to work there at his office in Olympia.”

A large gastropod, *Abyssochrysos raui* Goedert & Kaler, sp. nov., was named for Rau in recognition of his pioneering work on the foraminiferal biostratigraphy of Tertiary marine rocks in the Pacific Northwest by Goedert and Kaler (1996).

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