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A GEOLOGICAL QUIZ

Two evening meetings of the Geological Society of the Oregon Country, recently, were given over to "quiz" programs at which written questions were answered by members of a group of geologists. The programs were entirely unrehearsed. Some of the questions of general interest and their answers are given below. A few of the answers have been expanded somewhat in order to include pertinent references.

Where is the oldest formation in Oregon?

As fossil evidence is missing in the older metamorphic rocks, it is difficult to name accurately the oldest formation in Oregon. Schists in southern Jackson County near the California line are believed to be a part of the Abrams mica schist or the Salmon hornblende schist, both of which are more extensive in northern California. The age of these formations is tentatively given as pre-Cambrian as they are older than nearby Paleozoic strata. The Colebrook schist of Curry County is a metamorphic rock that is assigned to a pre-Devonian age. It may be of similar age to that of the Abrams and Salmon schists.

The Burnt River schists of northeastern Oregon which crop out near Baker, Oregon, are probably lower Paleozoic in age although there is little evidence for dating them.

What is the oldest fossil found in Oregon?

As fossil evidence is missing in most of the older rocks, the oldest known fossils are much younger than some of the rocks found in Oregon. Mississippian fossils (about 300 million years old) from the Suplee area are probably the oldest fossils that have been accurately determined. Horn corals and certain straight-coned cephalopods have been found in the Ironside Mountain area southwest of Baker in eastern Oregon. These may be Ordovician to Devonian (about 400 million years) in age and if so would be the oldest known fossils in Oregon.

What is the origin of bauxite?

Bauxite is the product of weathering in a moist, tropical or sub-tropical climate. Such weathering is called laterization. The parent rock must have little or no quartz and be upon a low-lying terrane in which the water table is high and erosion negligible. Such weathering results in leaching of soluble salts and combined silica from the rock, leaving an aluminous concentrate in the weathered rock called laterite. If this concentration of alumina is carried far enough bauxite is formed.

Please comment on the earthquake of May 1945 which was felt in the vicinity of the Good Samaritan Hospital and State Medical School. Is there a fault in this locality?

The shock referred to was felt by relatively few people and there might be some question as to its true origin, as heavy trucks, trains, and blasting give rise to reports of minor shocks. However, slight earthquake shocks have been common in Oregon, more common than most people believe; therefore it is not unlikely that the reported shock was a true earthquake.

Earthquakes in Oregon have been catalogued since 1846, and the record is being kept up to date by trained observers. The time and intensity are recorded. At least one shock has been recorded nearly every year.

Probably the most severe shock ever felt in Portland occurred February 3, 1892, at 8:30 p.m. It was rated an intensity of VII on the Rossi-Forel[1] scale. The shock was described as follows:

> "A severe earthquake shock occurred here at 8:30 o'clock to-night. Brick buildings swayed and windows rattled, terrifying the inmates, who in many instances rushed into the street. The shock lasted about thirty seconds, and was probably the most severe earthquake ever felt in this city. As far as known no damage was done."

Intensity VII of the Rossi-Forel scale is listed as follows:[2]

> "Overturning of loose objects; fall of plaster; striking of church bells; general fright, without damage to buildings."

Although few other quakes have been felt in Portland, the "State Line earthquake" of July 15, 1936, near Milton, Oregon, and Walla Walla, Washington, was of equal if not greater intensity, causing some damage.

Several writers have proposed a fault along the east face of the Portland Hills in order to account for the steep escarpment as well as the relatively straight trend. However the Portland Hills may be a fold, with the steeper side to the east. Dips of 10-14° to the east have been found near Linnton. Undercutting by the Willamette River, which was probably crowded against the Portland Hills during development of the Portland Delta, may explain the steep eastward slope.

Thus it is difficult to determine at this time whether there is a fault in this vicinity. Some earthquakes in volcanic regions are attributed to shifting of underground magmas.

Please explain how an ice sheet can move over level country.

Ice, although showing considerable rigidity, will, given time, yield to very little pressure. A great thickness of ice in the center of an ice field tends to spread out slowly. Ice will move up hill locally, but when viewed in perspective, this local movement is seen to be the result of pressure from a static head elsewhere transmitted through the ice. When ice spreads over relatively level ground, it is being pushed by the weight of a higher mass of ice.

Are fossils ever found in igneous rock?

The answer is generally no but some exceptions do occur. Large masses of the intruded rock are sometimes included in igneous masses. These masses are called xenoliths and they sometimes are fossil-bearing. Lava flows pick up some fossil material as they roll over sediments, including some of the sediments and fossils along with the lava.

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1 Townley, S.D., and Allen, M.W., "Descriptive catalog of earthquakes of the Pacific Coast of the United States 1769 to 1928," Seismological Soc. Am. Bull., vol. 29, no. 1, p. 254, 1939.

2 Idem., p. 11.

Plant materials, commonly trees, are often found in a charred condition where flows have surrounded them, and plant remains are probably more common than animal remains which require much more unusual conditions for inclusion within igneous rock.

Is it true that eastern Oregon at one time was a large inland lake or sea?

Eastern Oregon has been a part of the sea many times during geologic history. Marine sediments, which include shales, sandstone, and limestone of the upper Paleozoic formations are known, and there is good reason to believe that marine sediments of the lower Paleozoic are also present. Then again in the Triassic, Jurassic, and Cretaceous periods, seas invaded much of Eastern Oregon. There were, no doubt, many withdrawals and periods of erosion and nondeposition.

No arm of the sea is known to have invaded eastern Oregon during the Tertiary, but there were basins of interior drainage, which if not full of water, must have had ephemeral lakes such as broad playa lakes common in semiarid basins of interior drainage. The John Day fossils were buried by volcanic ash falling into such lakes. According to Dr. Hodge of Oregon State College:[1]

> "Condon Lake first formed as a result of partial damming of the ancestral Columbia River by the Dalles formation in the Cascade zone."

The Dalles formation is considered to be Pliocene by some and Pleistocene by others.

Hodge further suggests that Condon Lake was recreated by the damming of the ancestral Columbia when Mt. Hood was formed in approximately the location of the old river valley. The lake spilled over the range at its lowest place, its present site. Later down-cutting drained Condon Lake and superimposed many of the streams east of the mountains upon the lavas beneath the softer lake sediments.

Where are the proposed Willamette Valley dams?

The following seven dams have been planned, of which two have been completed and several authorized:

1. Fern Ridge Dam, northwest of Eugene, on Long Tom River, completed.
2. Cottage Grove Dam, south of Cottage Grove, on Coast Fork of Willamette River, completed.
3. Dorena Dam, east of Cottage Grove, on Row River has been authorized.
4. Meridian Dam near Lowell, on the Middle Fork of the Willamette River.
5. Quartz Creek Dam, east of Eugene, on the McKenzie River.
6. Sweet Home Dam, southeast of Albany, on the South Santiam River.
7. Detroit Dam, east of Salem, on the North Santiam River.

Are there any minerals of value in the Cascade Range?

Mines located in the Cascade Range have produced minerals totalling in value nearly $2,000,000. Gold and quicksilver lead the list, with silver, copper, lead and zinc having contributed to the total. The minerals which contain the values are pyrite, chalcopyrite, galena, sphalerite, and cinnabar.

Most of the mines are located in well-defined districts in the Western Cascades, no minerals having been produced from the High Cascades. These districts are in Clackamas, Marion, Linn, and Lane counties, and lie from 15 to 25 miles east of the edge of the Willamette Valley. The most important, from the standpoint of production, are the Bohemia district southeast of Cottage Grove, and the Black Butte quicksilver district a few miles south of Cottage Grove.

The districts may be described, from north to south, as follows:

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[1] Hodge, E.T., "Geology of the lower Columbia River," Geological Soc. Am. Bull., vol. 49 pp. 831-930, 1938.

Chena or Cheeney Creek district: Four miles south of Zig Zag on a branch of the Salmon River. Chinese produced about $1000 in gold in 1893, and in 1903 several tunnels and a shaft were dug.

Oak Grove district: Just below the Portland Electric Power Company dam on the Oak Grove fork of the Clackamas River, 25 miles southeast of Estacada. Several veins of cinnabar in calcite have been prospected during the last 10 years and have yielded a small production of quicksilver.

North Santiam district: Twenty miles east of Mehama on the north fork of the Santiam River. It was first developed in the 1890's, but most of the production was intermittent between 1915 and 1930. Metals produced have been gold, silver, copper, lead and zinc. This is one of the few zinc districts in the state. Recorded production of these metals between 1880 and 1941 is $14,884.

Quartzville district: About 25 miles northeast of Sweet Home on the Quartzville fork of the Middle Santiam River. This district was discovered in 1863, and was most active in the 1890's. Recorded production between 1880 and 1941 amounted to $181,494 in gold and silver.

Blue River district: Forty miles east of Eugene on the Blue River fork of the McKenzie River. This district had its greatest production between 1900 and 1912. Most of the recorded production of $173,789 in gold, silver, copper and lead came from the famous Lucky Boy mine.

Fall Creek district: Located 25 miles north of Oakridge near the North Fork of the Willamette River. Active around 1901-1903. Very little production.

Bohemia district: About 25 miles southeast of Cottage Grove on the upper drainage of the Row River. It was discovered in 1858, scarcely a decade after the first discovery of gold in southwestern Oregon. Much of the mining was done in the 1890's, between 1905 and 1916, and in the years just before World War II. Recorded production is nearly one million dollars, largely from the group of four mines, the Champion, Musick, Helena, and Noonday.

Black Butte district: Located 15 miles due south of Cottage Grove. One of the largest quicksilver mines in Oregon, the Black Butte mine was discovered in the early 1890's, and was worked intermittently until 1908, and between 1916 and 1919. The mine worked steadily from 1927 until 1942 when it closed down. Total production has been well over a million dollars.

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GEM STONES IN 1944 1/

Domestic Production Greatly Depressed

According to data compiled by the Bureau of Mines, United States Department of the Interior, the value of uncut stones, from domestic sources, used in jewelry and related industries approximated $41,000 in 1944, which is substantially lower than the $67,000 and $150,000 reported in 1943 and 1942, respectively. The professional gem miner sought strategic minerals; the amateur collector did not have gasoline or tires to pursue his hobby, and the tourist (the principal purchaser of domestic gem stones) was almost non-existent. The western lapidaries, professional and amateur, largely cut stock collected in a happier day. A few gem stones were byproducts of the intensive search for mica in the New England States. As producers, the leading States ranked as follows: Arizona, Wyoming, Colorado, Washington, Montana, and Oregon.

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1/ Prepared by Sidney H. Ball, under the supervision of Oliver Bowles, Chief, Nonmetal Economics Division; Economics and Statistics Branch.

Agates, jaspers, and related quartz minerals probably were next in importance. Most of them are obtained in Washington and Oregon. Other producers were Montana (moss agates), Arizona (agatized wood and chalcedony), Idaho, Colorado (agates), South Dakota (agates) and Wyoming (Sweetwater moss agates). Scotts Rose Quartz Co., Custer, S. Dak., sold a little rose quartz for jewelry use and larger quantities of lower grade material for rock gardens.

Bert A. Rhoades reports that 3,000 to 4,000 pounds of jade (nephrite) were mined in the Lander, Wyoming, field. He and Mr. Byford Foster ran small cutting shops continuously and readily sold all they could cut. Three other cutters worked part time. Fred Abernathy sank a pit on nephrite in place, but the nephrite so far found is in part altered. In the summer of 1944, rough nephrite was being sold at $1 to $10 a pound. Some of the green jade is of good quality and the black makes a good material for objects d'art.

Chinese agents purchased 5,890 pounds of Wyoming jade during the year to be shipped to China after the war.

The Montana sapphire industry had a poor year. Virtually all this sapphire is used industrially, only a small percentage being set in jewelry. The Perry-Schroeder Mining Co. of Helena, Montana, operated during only the first 4½ months of 1944. It produced about 4,500 ounces of culled sapphire containing $200 to $300 worth of gem material. No other Montana sapphire mine operated.

Alfred M. Buranek reports that the Clay Canyon, Utah, variscite deposit was worked for a short time in 1944 and that some good nodular variscite was shipped to the East. Smaller amounts were recovered from the Grantsville (Tooele County) and Lucin (Box Elder County) deposits. He estimates the value of the 1944 Utah production at approximately $2,000. He adds that Japanese internees collected some topaz from Topaz Mountain; that a little fine malachite and azurite were obtained from the Dixie Apex mine near St. George; and that other gem stones collected in the State included "snowflake obsidian" (Black Creek), jet (southeastern Utah) and agate and chalcedony (Colorado and Utah).

Dr. Stuart A. Northrop reports that some fine green smithsonite was produced in the Magdalena district, Socorro County, New Mexico.

Other gem stones produced in the United States in 1944 were transparent albite (Newry, Maine), amethyst (Stow, Maine), aquamarine (Newry, Maine; New Hampshire, North Carolina, and Virginia), caesium beryl (Maine), garnet (Arizona), golden beryl (Maine), obsidian (Arizona), peridot (Arizona), white topaz (Maine) and colored tourmaline (Rumford, Maine).

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Postwar Prospects

As to the postwar outlook, competition within the retail trade will be keen, but for a time the jewelry trade will have an advantage, for its reconversion should be rapid. One encouraging factor is that during the war many Americans have repressed a desire to spend money on beautiful things. However, if in the postwar period a substantial reduction in the national income occurs, the jewelry trades will be more adversely affected than those dispensing food, clothes and other necessities. With the re-entry of the European cutters into the market, gem cutters in the United States, South Africa, and Palestine will have keener competition. Some of the war-born cutting centers are likely to shrink in size or disappear. Although the consumption of industrial diamonds may decrease for a time, their expanding use in drill bits and wire drawing dies indicates that the industrial market will be well maintained.

Imports 2/

Precious and semiprecious stones (exclusive of industrial diamonds) imported for consumption in the United States, 1943-44

Commodity	1943		1944	
	Carats	Value	Carats	Value
Diamonds:				
Rough or uncut (suitable for cutting into gem stones), duty free	751,240	$37,443,240	896,547	$43,445,219
Cut but unset, suitable for jewelry, dutiable	193,701	31,458,089	169,097	29,263,121
Emeralds:				
Rough or uncut, free	8	248	1,966	1,668
Cut but not set, dutiable	3,194	32,508	38,666	81,233
Pearls and parts, not strung or set, dutiable:				
Natural	- - -	167,284	- - -	242,221
Cultured or cultivated	- - -	107	- - -	15,394
Other precious and semiprecious stones:				
Rough or uncut, free	- - -	47,726	- - -	105,401
Cut but not set, dutiable	- - -	2,590,931	- - -	3,725,453
Imitation, except opaque, dutiable:				
Not cut or faceted	- - -	2,621	- - -	14,550
Cut or faceted:				
Synthetic	- - -	167,166	- - -	503,718
Other	- - -	102,450	- - -	23,887
Imitation, opaque, including imitation pearls, dutiable	- - -	8,149	- - -	23,113
Marcasites, dutiable:				
Real	- - -	96,154	- - -	84,828
	- - -	72,116,673	- - -	77,529,806

2/ Figures on imports compiled by M. B. Price, of the Bureau of Mines, from records of the U.S. Department of Commerce.

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CLEARING HOUSE

CH-No. 84: R. E. Plumbe, 1703 Moreland Drive, Alameda, California, has the following dredging and earth-moving equipment available:

Northwest combination shovel and dragline, gas-driven, 1¼-yard power and 3/4-yard bucket, 55-ft. booms.

Washing plant, portable on cat. tracks, 33-ft. scrubber, sand pumps, conveyor loader, and stacker.

Gold saving devices - Pan American and Bendelari jigs, Ainlay bowls, sluices.

Dump trucks, DH7 bulldozer, caterpillar, elec. and gas welder, pumps, engines, camp equipment, pipe, testing machines.

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