AN OCCURRENCE OF LAZULITE IN OREGON

by Len Ramp and Norm Peterson

Lazulite, a bright blue, hydrous magnesium, iron, aluminum, phosphate mineral has not been reported before as occurring in Oregon. A narrow rib of altered quartzite in Jackson County contains lazulite in sufficient quantity to make it an interesting mineral occurrence.

Palache, Berman, and Frondel (1957) describe lazulite as the magnesian member of a magnesium-iron isomorphous series. The iron-rich member of the series is scorzalite which is rare. Lazulite normally contains about 45 percent phosphate (P_2O_5), 32 percent alumina, 17 percent combined magnesia and ferrous oxide, and 6 percent water.

Lazulite usually occurs as granular or compact masses but occasionally as prismatic to tabular monoclinic crystals. The color ranges from bluish white to deep blue or bluish green and it has a vitreous luster. It is brittle with an uneven to splintery fracture, has a hardness of $5\frac{1}{2}$ to 6, and a specific gravity of 3.2. Rarely it is transparent and of gem quality and it may be mistaken for lazurite, a gem mineral commonly called lapis lazuli.

Lazulite is easily identified with a petrographic microscope as it is practically the only blue pleochroic mineral with strong birefringence. Polysynthetic twinning is also common.

Lazulite has been described from occurrences in Georgia, North Carolina, California, South Dakota, New Hampshire, and Vermont in the United States as well as many foreign countries. Most of the occurrences reported in the literature are in quartzite and quartz schist with a few reported in quartz veins and granitic pegmatites as well as in alluvium.

Location: The lazulite in Jackson County Oregon occurs in a narrow

north-trending quartzite zone in sections 15 and 22, T. 37 S., R. 3 W. The bold outcrops in which it is found are between 3,600 and 4,000 feet elevation near the crest of a ridge at the headwaters of Galls Creek and Jackson Creek about 6 miles south of Gold Hill and 6 miles northwest of Jacksonville. The occurrence has been known for many years as it was discovered by early-day gold prospectors.

Geologic setting: The altered quartzite lies within a sequence of metamorphosed sedimentary and volcanic rocks of the Applegate Group of Upper(?) Triassic age. In addition to quartzite, the sedimentary rocks in the area include argillite, sandstone, and a small amount of limestone. Locally these rocks are altered to phyllite and schist. The volcanic rocks generally appear as hard greenish-gray altered lavas and tuffs with original textures difficult to distinguish. Within two miles of the occurrence on Timber Mountain and to the east in the Willow Creek and Jackson Creek drainage small diorite stocks are present.

The mineralized zone lying between these diorite bodies has a general trend of N. 15° W. Chloritic to micaceous schists adjacent to the zone have strikes from north to N. 28° W. and dip vertically. The altered quartzite containing lazulite is not continuous but occurs intermittently as lenses along a zone that can be traced for at least a mile. The width of the quartzite varies from less than 10 feet to as much as 50 feet where measured in an outcrop located near the north end of the zone in SW¼ sec. 15, T. 37 S., R. 3 W. At this location the quartzite is bounded on the west by a strong vertical shear zone containing talc and brecciated quartzite. The predominant rock type west of the shear is an altered intermediate to basic lava.

Three or four small quartz veins containing pyrite occurring in the zone have been prospected for gold. A few small diorite dikes are also present in the area.

Mineralogy: Local concentrations of lazulite occur in the quartzite as dark blue granular masses with irregular outline like splotches of ink and as smaller rectangular subhedral crystals. These masses vary in size from minute specks to as much as 2 inches across. By visual estimation some of the rock specimens collected contain as much as 30 percent lazulite. Associated minerals in the specimens and thin sections studied in order of abundance are: quartz, muscovite, apatite, specular hematite, pyrite, tourmaline, and rutile. The quartz has a granular mozaic texture typical of quartzites. Individual quartz grains vary from .05 mm to .3 mm in diameter. Smaller grains of apatite, .01 or .02 mm in diameter, are scattered through the quartzite. Percentages of the individual minerals are extremely variable over the deposit. In the thin sections examined apatite is estimated to make up about 3 percent of the rock and rutile less than 1 percent. A light-green, sodium-bearing muscovite occurs as radiate clusters or rosettes of flakes ¼ to 3/4 inch in diameter. Narrow zones in the altered quartzite contain as much as 60 percent of this attractive muscovite. The specular hematite is slightly magnetic and more abundant than pyrite in the specimens examined. Both the hematite and pyrite occur as clusters and individual grains scattered through the quartzite.

Genesis: From its texture as seen under the microscope, the lazulite appears to be formed as a replacement of the quartz. The phosphorous

probably originated from marine organic debris, later assimilated and deposited by hydrothermal solutions which emanated from the nearby diorite intrusives.

Use: An assay of the rock in which lazulite is abundant showed a phosphate content of 12 percent. Commercial phosphate rock should contain 25 percent or more P_2O_5.

A small amount of the colorful rock (from a pit in N½ sec. 22, T. 37S., R. 3 W.) has been quarried for ornamental building stone and used in fireplaces, planters, and building walls. The value of the deposit is probably limited to this use and as a mineral specimen locality.

Bibliography

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STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 STATE OFFICE BUILDING
PORTLAND 1

Date Nov 28 1962

Field Laboratory Number _____ Name DOGAMI - Len Ramp

General Laboratory Number P-27980 Address _____

Spectrographic Laboratory Number _____ City _____

QUALITATIVE SPECTROGRAPHIC ANALYSIS Mineta Crystals
(Quantities estimated to nearest power of ten)

1. Elements present in concentrations over 10%.

Ti rutile!

2. Elements present in concentrations 10% to 1%.

Si (mixed quartz)

3. Elements present concentrations 1% to 0.1%.

Na (from fingers) ?

4. Elements present in concentrations 0.1% to .01%.

5. Elements present in concentrations .01% to .001%.

6. Elements present in concentrations below .001%.

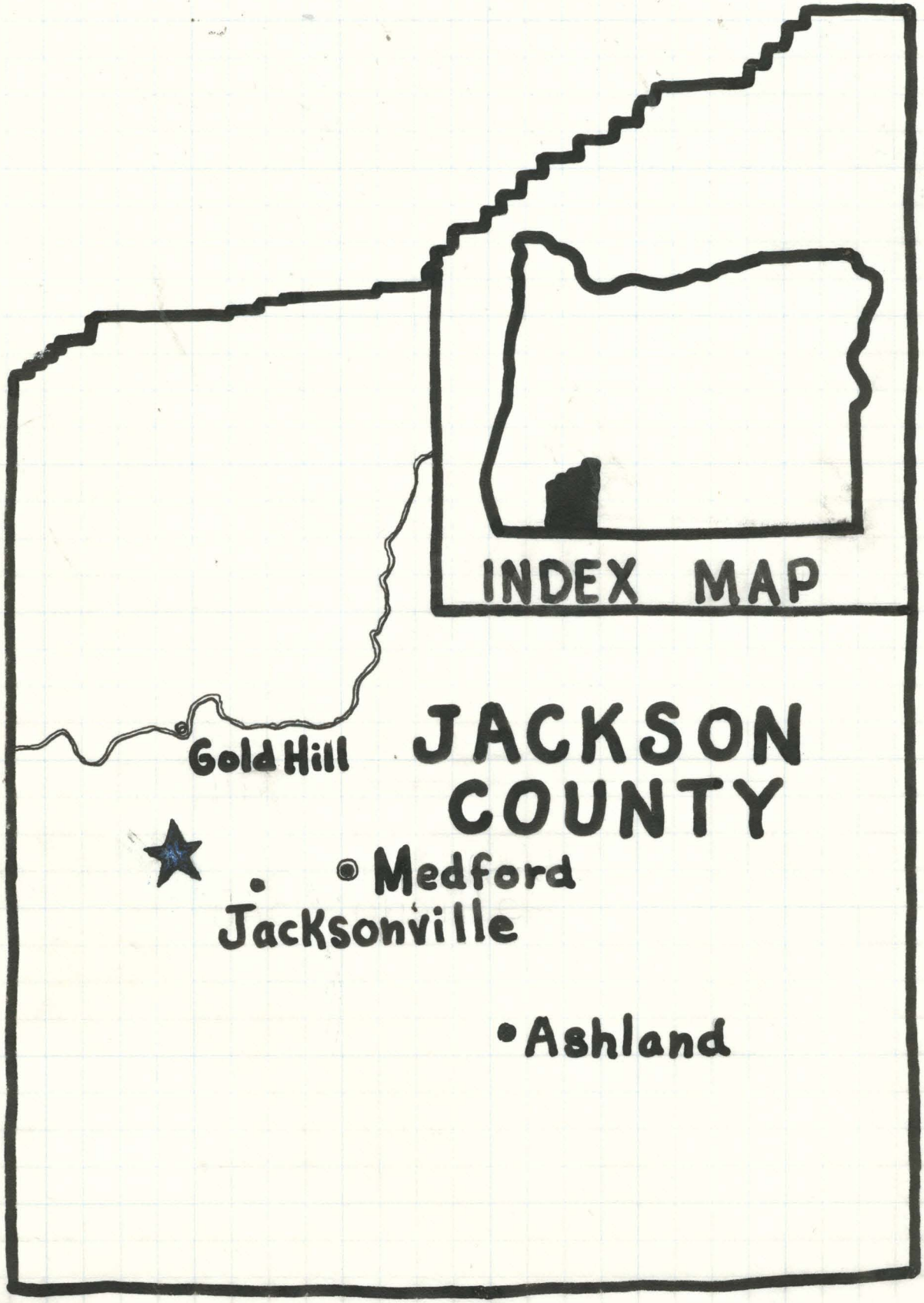
Radioactivity _____.

Mercury _____.

T C M

Thomas C. Matthews, Spectroscopist

Index Map Laqulite Occurrence



Slides

1. Index map
2. Location map, topographic
3. Quartzite with lazulite, hematite, pyrite.
4. Quartzite with lazulite, specular hematite
5. Quartzite with large splotches lazulite
6. Quartzite with lazulite and muscovite
7. Close up of muscovite and subhedral lazulite.
8. Cross nicols lazulite in quartzite showing polysynthetic twinning field $1\frac{1}{2}$ x $2\frac{1}{4}$ mm
9. Plane light lazulite, apatite, hematite, quartz -- least absorption
10. Plane light same as 9 showing greater absorption pleochroism
11. Specular hematite and apatite in quartzite
12. Lazulite with apatite in quartzite
13. Lazulite and hematite
14. Early man

Field of slides is $1\frac{1}{2}$ to $2\frac{1}{4}$ mm

CORRECTED PROGRAM

OREGON ACADEMY OF SCIENCE

Geology - Geography Section

Group I Morning Session, Holly C. Wagner presiding

10:15 a.m. 20 min. "Geomorphology of the Oregon continental terrace south of Coos Bay."
John V. Byrne, Department of Oceanography, Oregon State University.

10:35 a.m. 20 min. "Estuarine and marine sediments, Coos Bay and vicinity, Oregon."
J. C. Cummings, Department of Geology, Oregon State University.

11:00 a.m. 20 min. "Shallow seismic reflection studies, Yaquina Bay, Oregon."
James Whitcomb, Geophysics Research Group, Department of Oceanography, Oregon State University.

11:25 a.m. 20 min. "Near shore marine gravity range, Newport, Oregon."
W. A. Rinehart and J. W. Berg, Jr., Geophysics Research Group, Department of Oceanography, Oregon State University.

11:50 a.m. 20 min. "Lower and middle Eocene formations of southwestern Oregon."
E. M. Baldwin, Department of Geology, University of Oregon.

Group I Afternoon Session, W. D. Wilkinson presiding

3:00 p.m. 30 min. "Evolution of the Tertiary geosyncline of western Oregon and Washington."
P. D. Snavely, Jr., and Holly C. Wagner, U. S. Geological Survey, Menlo Park, California.

3:40 p.m. 15 min. "Some Permian biostratigraphy of eastern Oregon."
David A. Bostwick, Department of Geology, Oregon State University.

4:00 p.m. 20 min. "Tertiary stratigraphy of Steens Mountain area, Harney and Malheur counties, southeastern Oregon."
G. W. Walker and C. A. Repenning, U. S. Geological Survey, Menlo Park, California.

4:25 p.m. 15 min. "An occurrence of lazulite in Oregon."
Len Ramp and N. V. Peterson, State of Oregon Department of Geology and Mineral Industries, Grants Pass.

Group II Morning Session, Ernest H. Lund presiding

10:15 a.m. 15 min. "Reclaiming dredge tailings, Sumpter and John Day valleys, Oregon."
N. S. Wagner, State of Oregon Department of Geology and Mineral Industries, Baker.

10:35 a.m. 15 min. "Engineering geology of the Carmen Smith Diversion Tunnel."
L. W. Staples, Department of Geology, University of Oregon.

10:55 a.m. 15 min. "Resumé on the structure of the White Salmon quadrangle, Oregon-Washington."
R. C. Newcomb, U. S. Geological Survey, Ground Water Branch, Portland.

11:15 a.m. 20 min. "Composite plutons in northeastern Oregon."
W. H. Taubeneck, Department of Geology, Oregon State University.

11:40 a.m. 20 min. "Potassium-argon ages of porphyritic quartz monzonites in the east-central Sierra Nevada, California."
R. A. Brodersen, Department of Physical Sciences, Oregon College of Education, Monmouth.

Group II Afternoon Session, J. W. Berg, Jr., presiding

3:00 p.m. 20 min. "Interpretation of the Ouachita Mountains of Oklahoma as an autochthonous folded belt."
Keith F. Oles, Department of Geology, Oregon State University.

3:25 p.m. 15 min. "The Corvallis Standard Seismograph Station."
E. F. Chiburis, Geophysics Research Group, Department of Oceanography, Oregon State University.

3:45 p.m. 15 min. "Seismicity of Oregon."
Verrill Redo and Robert Gaskell, Geophysics Research Group, Department of Oceanography, Oregon State University.

4:00 p.m. 20 min. "Travel-time curves for western Oregon."
Peter Dehlinger and E. F. Chiburis, Geophysics Research Group, Department of Oceanography, Oregon State University.

4:25 p.m. 15 min. "Near source seismic energy calculations."
Lynn Trembly and Philip Laun, Geophysics Research Group, Department of Oceanography, Oregon State University.

WG - 215
Complete Spec.

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

2033 First Street
Baker, Oregon

1069 State Office Building
Portland 1, Oregon

239 S.E. "H" Street
Grants Pass, Oregon

REQUEST FOR SAMPLE INFORMATION

The State law governing analysis of samples by the State assay laboratory is given on the back of this blank. Please supply the information requested herein fully and submit this blank filled out along with the sample.

Your name in full Len Ramp (DOGAMI)

Street or P.O. Box P.O. Box 417 City & State Grants Pass, Oregon

Are you a citizen of Oregon? Yes Date on which sample is sent 12/21/62

Name (or names) of owners of the property

Are you hiring labor? Are you milling or shipping ore?

Name of claim sample obtained from

Location of property or source of sample (If legal description is not known, give location with reference to known geographical point.)

County Jackson Mining District Gold Hill

Township 37 S Range 3 W Section 15 & 22 Quarter section

How far from passable road? ½ mile Name of road Timber Mountain

	Channel (length)	Grab	Assay for	Description
Sample no. 1		x	Complete Spec.	
Sample no. 2				

(Samples for assay should be at least 1 pound in weight)

(Signed) L. R.

DO NOT WRITE BELOW THIS LINE - FOR OFFICE USE ONLY - USE OTHER SIDE IF DESIRED

Sample Description Green mica from lazulite occurrence with minor amount of mixed hematite, apatite and quartz.

Sample number	GOLD		SILVER					
	oz./T.	Value	oz./T.	Value				
WG 215 P-28045	Complete Spec. ([redacted])			--	---	---	---	---

Report issued Card filed Report mailed 6-11-63 Called for

SIR-5

FIELD OFFICES:
2033 FIRST STREET
BAKER
239 SOUTHEAST "H" STREET
GRANTS PASS

STATE OF OREGON
DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES
1069 STATE OFFICE BUILDING
PORTLAND 1

Date January 11, 1963

Field Laboratory Number WG-215 Name Len Ramp

General Laboratory Number P-28045 Address DOGAMI

Spectrographic Laboratory Number _____ City _____

QUALITATIVE SPECTROGRAPHIC ANALYSIS
(Quantities estimated to nearest power of ten)

green mica from
lamprophyre dike

1. Elements present in concentrations over 10%.

   Silicon, aluminum

2. Elements present in concentrations 10% to 1%

   Iron(low), sodium, potassium ? Paragonite?

3. Elements present in concentrations 1% to 0.1%

   Calcium → apatite

4. Elements present in concentrations 0.1% to .01%

   Magnesium, titanium, chromium → rutile

5. Elements present in concentrations .01% to .001%

   Copper, barium, strontium, nickel

6. Elements present in concentrations below .001%

   Manganese

Radioactivity Nil

Mercury Nil

Thomas C. Matthews, Spectroscopist