GEOLOGICAL NEWS LETTER

OFFICIAL PUBLICATION OF THE

VOL. 4 NO. 1 to 24 PORTLAND, OREGON 1938

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
413 Morgan Bldg. Portland, Oregon
POSTMASTER: Return Postage Guaranteed

AUTHOR INDEX FOR VOLUME IV

(Ruth E. Hickman)

SUBJECT INDEX FOR VOLUME IV.

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Edwin T. Hodge, Editor
2915 N.W.Luray Terrace,
Portland, Oregon

Raymond L. Baldwin, Business Manager
2725 N.E.50th Avenue,
Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.
Yearly subscriptions. . . . . $2.00.
All material for publication in the Bulletin should be sent to the Editor.
Address all other correspondence regarding the Bulletin and changes of address to the Business Manager.

Vol. 4 - No. 1 Portland, Oregon January 10, 1938

LECTURES

Jan. 14, 1937 (Friday) - Dr. Warren D. Smith. Subject: "The Geomorphology of Oregon or the Evolution of Oregon's Facial Expressions."

NEW MEMBER OF SOCIETY.

Dr. and Mrs. E. E. Osgood are receiving congratulations on the arrival of Beverly Maru, Dec. 29th, 1937. Bevery Maru weighed 8 lbs. 3 oz. and both mother and youngster are doing nicely. The Geological Society of the Oregon Country wishes to extend its best wishes for a long and happy life for Her Majesty, and to her parents.

EXTENSION COURSE ANNOUNCEMENT

Dr. Hodge's course on Natural Resources will be continued next term; the class meeting on Thursday night. While the course carries advanced credit, the lectures are popular and understandable by beginners.

BULLETINS BOUND

Members desiring to have Vol. 3 of Geological News Letters bound, please get in touch with Business Manager.

NEWS LETTER HAS NEW FORMAT

This issue of our Geological News Letter comes from the rolls of a new multigraph machine purchased by authority of the Executive Committee.

In the past our bulletin has been printed on borrowed mimeograph machines. We have known that such an arrangement could not continue indefinitely. It would not be fair to those who have been most helpful to us.

Our new machine is the latest thing in duplicating equipment. Its purchase gives us the feeling that at last we are standing on our own feet. We believe that it will enable the manager to put out a more attractive looking bulletin.

Through a saving in the cost of publication we will return the cost of the new machine to the Treasury in three years. As a proper christening for our new equipment we call your attention to the important paper on the Cascades by Dr. Edwin T. Hodge beginning in this issue. We are off to a good start - let's make 1938 a banner year for the Society.

A. D. Vance, President.

STATE DEPARTMENT OF GEOLOGY ANNOUNCES BULLETIN #2.

Libbey, F. W., "Progress Report on Coos Bay Coal Field", State of Oregon, Dept. of Geology & Mineral Industries, Bulletin #2. 14 pp., 3 maps, 1 pl., January 1938. Price 10¢. It can be obtained by writing the Department, enclosing 10¢, or applying at the Department office, 704 Lewis Bldg., in person.

PUBLICATIONS

Camp, Charles, and Hanna, G. D. "Field & Museum Technique in Paleontology". cloth bound, $2.50, University of California Press, Berkeley, Calif. They state, "To the best of our information, this will be the first practical manual in paleontology ever to be published in the United States, and it should prove highly useful on the shelves of your library". The manual will be published about January 15th, and orders are being received. It is profusely illustrated.

Verhoogen, Jean, "Mount St. Helens, A Recent Cascade Volcano." Unv.of Calif. Press, v.24, no.9, pp.263-302, plate 7-9, 13 text figures,Oct.26, 1937. Price $0.65.
Succeeding deposition of marine Eocene sediments, volcanic activity was initiated probably in Eocene or Oligocene times. Deformation before Keechelus andesites of late Miocene. These intruded by quartz diorite. Later,acidic material erupted from vent situated near the present Mt.St.Helens. A large volcano may have been formed which was subsequently worn down by glaciers which covered the region. At close of glacial epoch, region had acquired its main topographic features;then began upbuilding of Mt.St.Helens. Starting with outpouring of olivine basalts,the story is that of successive eruptions of basalts & andesites. Pyroclastics are restricted mostly to the very early & late stages of activity. Physiography helps prove some points,and indicies the early topography. Marble Mtn.probably Keechelus andesite. Geologic map shows Goat Rocks deposits,talus from central plug,plug domes,recent andesite, recent pahoehoe lava,mudflows & other pyroclastics,undifferentiated Mt.St.Helens lavas,Tertiary granodiorite,older formations such as sediments and andesites. Main part of the article is petrographic, geologic relationships seem indecisive.

THE CASCADE PLATEAU PROVINCE.

Edwin T. Hodge.

Introduction:

Although some students of the geography of Oregon divide the state according to watersheds, which would eliminate this province as a separate entity, students of physiography find it more logical to place the Cascade Mountains in a distinct natural region and we do so here.

Economically this region is of vast consequence since one of the few remaining great forests of the United States is found here, and great rivers furnishing the life blood, as it were, for the plains and valleys both to the west and the east have their source in these mountains.

Because of the vast and varied volcanic formation, rugged terrain, primeval forests and clear streams, myriads of water falls, wild life, and accessibility, it is the premier recreational portion of the entire state.

Geography

To delimit this province very exactly is impossible, but in general we may think of it as a broad belt of rough, mountainous country extending from far to the north of the Oregon line to below Mount Lassen in Northern California and some 50 to 100 miles wide. In Oregon it is bounded on the north by the Columbia River, in the south by the California state line, on the west by the Willamette Valley, and on the east by the western side of the valley of the Deschutes and the low divide just east of the Klamath Lakes. (Figure 1). The province comprises an area roughly of 16,000 to 20,000 square miles, and includes portions of the following counties: Hood River, Wasco, Multnomah, Clackamas, Marion, Linn, Lane, Douglas, Jackson, Klamath and Crook. In addition it embraces all of Crater Lake National Park and a portion of the Warm Springs Indian Reservation.

Topography

Topographically this broad dissected lava plateau with its crowning chain of volcanic peaks is the most important feature of the state since it divides the state into a one-third western marine portion of moderate elevation and a two-thirds continental and relatively high eastern portion. West of the crest the climate is humid, while to the east of it the country is semi-arid over vast stretches.

The relief is very pronounced due to the erosion by both water and ice and the great irregularities of surface of many of the lava flows especially of the rough type, called by the Hawaiians "A-a". Elevations run from approximately 500 feet at the boundary of the Willamette Valley to 11,240 feet (Mount Hood) the extreme high point of the range in Oregon. Owing to greater rainfall on the western side of the range the dissection by the streams has been greater and here the country is more rugged.

Physiographically speaking we may regard this region as a great lava plateau on which is superimposed a line of volcanic peaks which are in different stages of erosion. From many points on the summit one can look out over an almost even surface, or so it appears to be, which, were it not for the timber, one might easily mistake for prairie land in some areas. Especially striking is this as one makes his way to Crater Lake where the rise is almost imperceptible in places and only at last and very suddenly, does one realize that he is some thousands of feet above sea-level on the crest of the range.

This comparative evenness of surface is not due as some have thought to peneplanation. It represents a surface that is structural and not erosional.

If one is observant he will note quite different profiles as he ascends the valleys from the west or the east to the top of the plateau. Owing to two factors, the greater rainfall and the greater gradient of the western slopes, the stream valleys are longer and deeper on the western side. While a trip along the "Skyline Trail" is very deceptive, in places the traveller being given the impression of traveling along a fairly level plain at times, if one attempts to follow a north and south line somewhat farther down the slopes, he will be obliged to cross some stupendous canyons.

Hydrography.

The hydrography of the region consists chiefly of rivers and lakes, with the addition of a few man-made reservoirs, ditches or flumes and mill-ponds. Beginning at the summit we find hundreds of lakes, generally of volcanic origin - the chief of these being the world-famous Crater Lake which will be referred to again in greater detail. Some of the principal lakes are Odell, Crescent, Diamond, Suttle, Fish Lake, etc. Bull Run Lake on the slopes of Mount Hood furnishes the city of Portland's water supply.

The principal rivers of the Cascades flow to the westward into the Pacific Ocean. They are usually swift and clear.

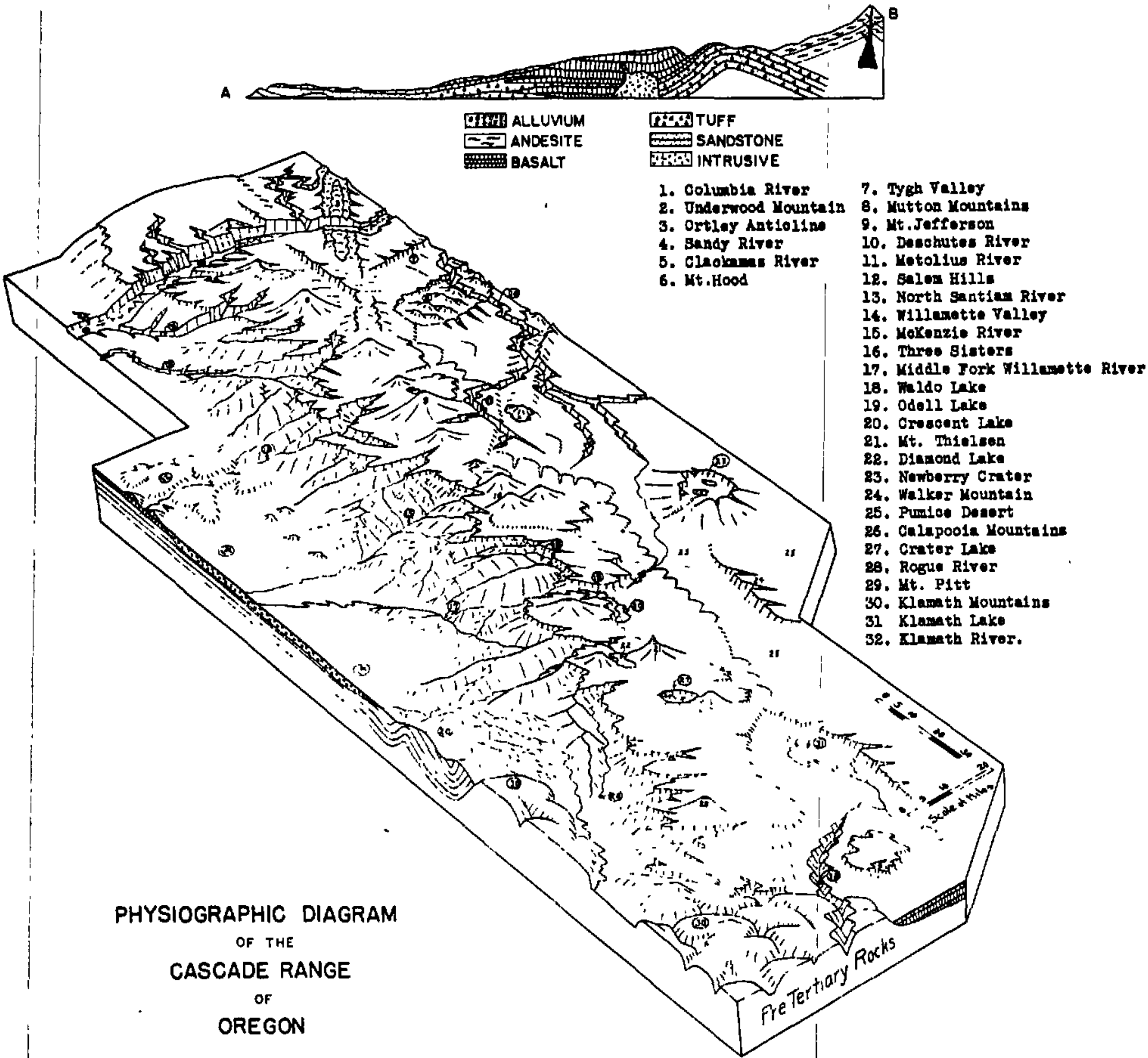
Both the Rogue, which rises near Crater Lake, and the Umpqua, which rises near the summit of the range between Crater Lake and Crescent Lake, flow through the Coast Range to the sea. The Willamette River rises near Summit Lake and after being reinforced by two other forks, reaches the broad, flat-bottomed valley through which it meanders its way northward to the Columbia at Portland. The McKenzie, Santiam, and Clackamas are the other important streams, but much shorter ones, which flow down the western side of the Cascades to the Willamette Valley.

From the eastern slope, the Deschutes and Metolius and a few minor streams send their waters to the Pacific via the Columbia.

None of these streams is navigable for other than row boats within the limits of the Province. A few short tributaries of the Deschutes River and Klamath are found running off the more abrupt eastern slopes of the Cascades, but they are relatively insignificant.

Climate

In this mountain province we may experience nearly every gradation from warm, moist, temperate to that of regions covered perennially by snow and ice. The two



PHYSIOGRAPHIC DIAGRAM
OF THE
CASCADE RANGE
OF
OREGON

most marked features of the climate are the definite zoning vertically where temperature differences are the most marked according to altitude, and another or horizontal zoning east and west wherein precipitation changes are the most striking. On the west side of the summit the region enjoys heavy precipitation and is therefore densely forested, while the eastern slopes fall into a definite rain shadow with a corresponding change in vegetation. As an illustration of the precipitation, at Crater Lake in 1934 a total snow fall of 90 feet for the winter was officially recorded. The Cascades form a barrier to the moisture-laden winds from the Pacific, producing on the west slope great precipitation. This precipitation is due to adiabatic cooling and is in marked contrast to that resulting from convectional storms farther east.

The summer months are relatively dry except for occasional thunder storms in the high mountains.

From Miss Hopson's modified Koppen scheme we see that there are three different types of humid climate here, the dominant one being Ds, somewhat drier, running in a broad ever-widening band to the southward on the eastern side, a belt of Cs, more humid, on the western side, but narrowing to a point about two-thirds of the distance to the south. In the vicinity of the highest peaks there are small areas of E climate (arctic or alpine).*

Owing to the general salubrious nature of the climate of most of this region and attractive scenic features, many excellent summer and winter resorts are found especially in the Mount Hood area. Ascending, or going from the more humid to the drier eastern side, one can obtain almost any kind of climate he may prefer or find most beneficial to his health.

Flora and Fauna

Biologically considered, this province comprises Transition, in the foothills and up to 4,000 feet, Canadian (in the Mount Hood area), 4,000 to 6,000 feet elevation; Hudsonian 6,000 to 7,000 feet and Alpine 7,000 to 10,000 feet. In the Mount McLoughlin area these zones are as follows: Canadian 5,000 to 7,200 feet, Hudsonian 7,200 to 8,200 feet, and Alpine 8,200 feet and over.

According to Bailey** the Canadian zone is characterized by the Lodge Pole pine (Pinus murrayana), Western yellow pine (pinus ponderosa), Western white pine (Pinus monticola), Engelmann spruce (Picea engelmanni), Shasta fir (Abies shastensis), Great silver fir,(Abies grandis), Alaska cedar (Chamaecyparis nootkatensis), Aspen (Populus tremuloides), Mountain maple (Acer glabrum (?), Mountain ash, (Pyrus sitchensis), Highbush cranberry (Viburnum opulus var.americanum). This zone is characterized by such animals as: Snowshoe rabbit (Lepus americanus klamathensis), Brown and dusky conies (Ochotana princeps brumescans and fenisex fumosa), Cascade flying squirrel (Glaucomys sabrinus fuliginosus), Yellow bellied marmot (Erithezon epixanthum), Cascade meadow mouse (Microtus richardsoni arviculoides), Mountain jumping mouse (Zapus trinotatus mountanus), Mazama gopher (Thomomys monticola mazama), Oregon jay (Perisoreus obscurus obscurus), Thurber's

* D-Humid, Jan.Mean Temp.less than 32° F. C-Humid,Jan.Temp.more than 32° F.
S-Summer drought E-Tundra

** Mammals and Life Zones of Oregon, Bu.Biol.Bull.55 U.S.Dept. of Agriculture junco (junco oreganus thurberi), three-toed wood-pecker (Picoides tridactylus fasciatus), Williamson's sapsuckers (Sphyrapicus thyroideus thyroideus), Cassin's finch (Carpodacus cassini), etc.

The Hudsonian zone is the narrow timber line belt just below the snow and ice fields of the higher peaks. In this zone, among others we note: White barked pine (Pinus albicaulis), Alpine hemlock, (Tsuga mertensiana), Alpine larch (Laris lyalli), Alpine fir (Abies lasciocarpa), Alpine mountain ash (Sorbus occidentalis), Heather, White Rhododendron (Rhododendron albiflorum), Red monkey flower (Mimulus lewisii), Mountain lily (Erythronium montanum), Wild currant (Ribes howelli), stonecrop (Sedum debile).

Some of the animals of the zone are: Sierra squirrel (Sciurus douglasii albOlimbatus), Yellow-bellied marmot (Marmota flaviventris ovara), Baird's creeping mouse (Microtus oregoni bairdi), Mazama pocket gopher (Thomomys monticola mazama).

In the Arctic-Alpine zone the plants are low or prostrate forms such as: Wind flower (Anemone hudsoniana), Phlox (Phlox douglasii), Penstemon (Penstemon Menzesii), Alpine speedwell (Veronica alpina), Cinquefoil (Potentilla flabellifolio), Red mimulus (Mimulus rubellus).

Transportation and Communication

The Cascade Mountains are well served by both railroads and highways. Two railroads extend through the range - the Union Pacific along the Columbia River and the Southern Pacific farther south between Eugene and Klamath Falls. Seven more or less paved and all improved highways cross from east to west and two of these, at least, remain open all winter. The principal highways are (from north to south):
1. The Columbia Highway (the nearest to water grade); 2. The Wapinitia "Cut-Off"; 3. The Santiam Highway; 4. The McKenzie Highway; 5. The Willamette Highway; 6. The Crater Lake Highway; 7. The Ashland-Klamath Falls Highway.

What with good landing fields on both sides of the Range and emergency fields in the mountains airplane travel across the mountains is increasing yearly.

Telephone lines follow most of the highways. The extensive telephone system of the U. S. Forest Service makes all parts of the province readily accessible to communication practically the year round.

In addition to the above there is a vast network of forest roads and trails, mainly built by the Government, with occasional resthouses, so that even foot travel is made comparatively easy during many months of the year. In the winter, of course, travel in the High Cascades is mainly on snowshoes or skiis.

Population

The population of this province is very scattered and difficult to tabulate as many of the people are residents during the summer season only. The total population of more or less permanent residents would probably not exceed five thousand (outside the towns).

The general make-up of the local residents, not counting the summer transients, is as follows: 1. Employees of the Forest Service, Crater Lake National Park; 2. Employees of the Southern Pacific Railroad; 3. Prospectors and trappers; 4. Employees of Lumber Companies; 5. A few homesteaders; 6. Keepers of recreational resorts.

Very few towns are found in the region and most of the villages have only twenty or thirty people each. Oakridge, perhaps the largest permanent settlement in the mountain area proper, has a population of five or six hundred. In Klamath Falls and Hood River, of course, there are considerable and fairly stable populations.

In the summer months, of course, this more or less stationary population is increased enormously as a result of the influx of tourists, fishermen and herdsmen. At Crater Lake, for instance, where there will be only a half dozen persons within the park in the dead of winter, there will be 3,000 visitors on holidays during July and August.

One is often struck, as he travels in the Cascades, as in other mountain areas, with some of the interesting characters among the permanent residents. Some of these residents are the result of backwashes from the early immigrants. These make an interesting sociological study. But this is the case in any mountainous territory anywhere in the world and is not peculiar to Oregon.

As in other parts of the state, one is struck by the nearly 100% American character of the population, there being very few foreigners outside of the Mexicans working on the railroad lines and the Scandinavians in the lumber camps. Most of the latter are American citizens.

Geology

The Cascade Mountains is a term applied to a superficially continuous mountain mass extending from Northern California through Oregon, Washington, British Columbia into Alaska. However, such a name to diverse mountain groups is one of the penalties science must suffer from the custom of permitting adventurers and statesmen to assign names to earth features. The custom not only injures the scientific appreciation of the earth features by our people but leads to numerous political and economic difficulties.

Scientifically considered the Cascade Mountains begin in the eastern half of Siskiyou County, California, extend through Oregon into the southern part of Pierce County, a little north of Mount Rainier, Washington.

The Cascade Mountains serve as a part of a barrier that extends without interruption, except at the Columbia River, from Tierra del Fuego to the Bering Peninsula. As such it has shut off the migrations of plants, animals and man from one side of the mountains to the other. Ancient man landing on the northwest coast of North America on his journey from Asia was forced to follow the Pacific Coast to the Columbia River Gorge where he found the only passage way eastward to the flat lands of North America. The Cascade obstruction, even with the progress of invention and the mechanics of living, still remains a divide separating political, agricultural and industrial units of diverse character.

Climatically the divide is of supreme importance. Here the warm moist winds from off the Pacific Ocean are forced to ascend, unload their moisture and thus descend dry and clear to desiccate, blast with heat, chill or ravage with cyclonic storms the lands to the east.

Perhaps the best way to explain the composition and origin of the Cascade Mountains is to treat the subject historically beginning with the oldest pertinent event.

It is evident from the data now available that the Cretaceous seas extended from the Pacific Basin across the site of the Cascades into eastern Oregon. They withdrew about 45,000,000 years ago. (Figure A).

There, east of the Cascade area, a mountain range was lifted, eroded, and its eroded products carried westward into the Eocene sea. (Figure B). The location of the shore of the Eocene sea is not definitely known and it is not certain that any marine beds form a part of the Cascade Mountains. There is some evidence that lava flows (mostly rhyolites of the Clarno series) flowed westward and covered areas as far west as Oakridge, Cascadia and Detroit. On Bull Creek of the Oakgrove fork are lignite bearing sandstones that may also be deposits formed in Eocene Swamps.

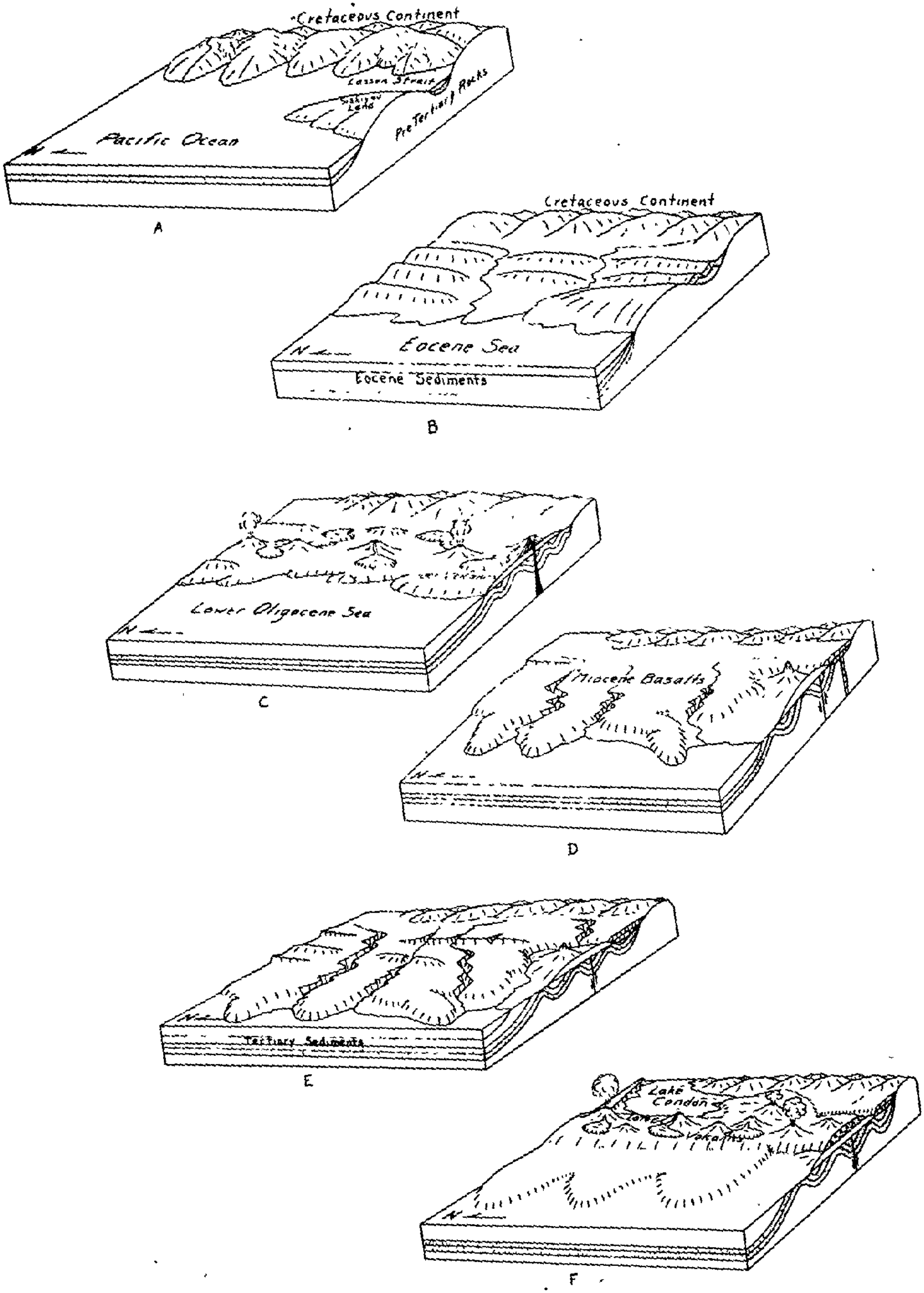
In the Calapooya Mountains, northeast of Roseburg, beds have been correlated with lower Eocene (Umpqua formation) and upper Eocene (Calapooya formation).

These beds carry only leaves, which are very poor evidence of geologic age and resemble so much typical Oligocene formations farther north in the Cascade Mountains that the writer is in much doubt as to their true age. The same conclusions are held regarding coal bearing beds near Ashland.

In any event the Cascade area at the close of the Eocene 30,000,000 years ago was a land area of low relief; it was not a mountain area.

In the Oligocene 30-20 million years ago the Pacific Ocean reached as far east as Oakland, perhaps Oakgrove, Aumsville, Mill City and Scappoose. (Fig.C.) Rather clear waters extended to Oakland where limestones were formed close to a shore to which from time to time rivers carried mud and sand.

Near the Black Butte-Elkhead region, Eugene, and Willamette Tualatin valleys the lower Oligocene is made up of near shore sands, gravels, and clays and contains marine fossils. In the Santiam valley, on Bull Creek, a branch of the Clackamas and below the heavy agglomerate bed at Bonneville dam are somewhat similar sediments containing leaf fossils and their coal beds. The land of the western half of the Cascades was at least of low elevation and the sediments were derived from highlands that lay some distance eastward.


Cretaceous Continent
Lassen Strait
Siskiyou Land
Pre-Tertiary Rocks
Pacific Ocean
A
Cretaceous Continent
Eocene Sea
Eocene Sediments
B
Lower Oligocene Sea
C
Miocene Basalts
D
Tertiary Sediments
E
Lake Condon
Cones
Volcanics
F

At the close of lower Oligocene continuing throughout the upper Oligocene vulcanism of the explosive type was active from the upper Umpqua basin to Mount Rainier region. The coarse volcanic agglomerates of this age all lie in the central belt of the Cascades, and eastward and westward the material grades from coarse agglomerates to tuffs and finally to ashes. Hence we conclude that the building of the Cascade volcanic pile began in middle Oligocene time using a rift along the central axis of the Cascade mountains. Westward the ashes and tuffs fell into the sea and entombed fossils to form the Oakland, Eugene, Ilahe and Pittsburg formations. To the east the westward winds carried the fine ashes far over a laked country where terrestrial vertebrates and leaves are preserved on the John Day formation.

Within the Cascades the Calapooya (east of Roseburg), the Cascadia (in the McKenzie), the Mehama (in the Santiam), and the Eagle Creek (more properly Warrendale in the Columbia Gorge), form beds 500-1000 feet thick in the core of the Cascade Range. The volcanoes and the great pile of pyroclastics we may call the "First Cascade Range".

The above events continued into the Lower Miocene at the close of which ensued a short period of gentle folding and some erosion.

After the above and about 18 million years ago erupted from thousands of vents over a long period of time the basalts which covered, except for a few high lands which remained like islands uncovered, most of Oregon, Southeastern Washington, Southeastern Idaho, Northern Nevada and Northeastern California. The lavas formed a mantle 3000-5000 feet thick so extensive and uniform that it has been called a "basaltic flood" and is named "Columbia River Basalts" ("Coriba"). (Figure D).

The eruption of the Coriba occupied all of Middle Miocene time and produced a uniform plateau surface. At the conclusion the final ashes were carried eastward to form the Mascall formation. During the same time the sea was filled and its shore removed to almost its present site. Into it were carried pebbles to form the Empire formation.

No evidence of upper Miocene has been found in the Cascade Mountains.

At the close of the Miocene and perhaps in lower Pliocene the basalts were gently folded and normally faulted over vast areas. Just west of Hood River Valley and east of Idana on the Santiam are found portions of a belt of compressed folds. Also along the east wall of Hood River valley just east of Metolius River, parallel with the south branch of the Santiam and on the east face of the Cascades near Klamath Falls are great north-south faults. The faults and closely folded belt suggest a "belt of weakness" that was favorable outlet for venting hot liquid igneous material from the earth's center. (Figure E).

(to be continued)

ANNUAL MEETING
The Event of the Year.

Come and eat! Come and see! Come and hear!

Stunts! Music!

THE SCOOP OF THE AGES.

Friday - February 25,1938 7:00 P. M. Reed College Commons.
Places - $1.25 per plate.

Your committee has secured for the principal speaker on this occasion, an outstanding citizen of Oregon, with wit, humor, humanity and a history. He knows his Geology and knows how to tell it. The Speaker will be

PHIL BROGAN of Bend, Oregon,
speaking on
"Great News Stories of Ancient Oregon"

You will hear the contemporary events of the past ages, in vivid, racing, newspaper style, with all the embellishments with which only a newswriter can adorn them. An ancient subject with a new dress (or trousers, if you prefer), with all the glittering, scintillating and glamorous events of the past brought before you in a manner which will make them live again. It will be colossal - Phil Brogan will be colossal - in fact, he is even colossal in his modesty.

Who is he? Well, since 1923 Brogan has been a member of the editorial staff of the Bend Bulletin and his editorials have been widely copied by Oregon newspapers. He has also written many Sunday features for newspapers, including articles dealing with Oregon's ancient fauna and flora. One of Brogan's most recent features was "Studying Oregon's Ancient Weather with a Geologist's Pick." The Bend newspaper man has also contributed articles to nationally known scientific magazines, including Science Service.

Since completing his work at the University of Oregon, where he minored in the study of geology under Dr. Earl LeRoy Packard, Dr. Edwin T. Hodge and Dr. Warren D. Smith, Brogan has been closely in touch with Oregon geology, and several years ago was a member of the party that accompanied internationally famous geologists on a tour of the John Day basin. The Bend man has collected fossils for a number of institutions and has worked with Dr. Ralph W. Chaney, University of California paleobotanist, in the Central Oregon field.

Brogan has been instrumental in bringing out a number of new horizons to the attention of geologists. One of these is the new Mascall locality near Gateway, Jefferson County, and the new Bridge Creek exposures on Gray Butte and West Branch Creek. The Bend writer was guide for the party of the Geological Society of the Oregon Country that visited central Oregon last spring.

This year the tickets will be sold by plat. Each purchaser may select the table at which he chooses to sit. Refer to the plat below and make your selections, but make your purchase immediately if you want the best choice, although all tables are placed where everyone may hear and see. The stunts will not be at the speaker's table, but on the opposite side of the room.

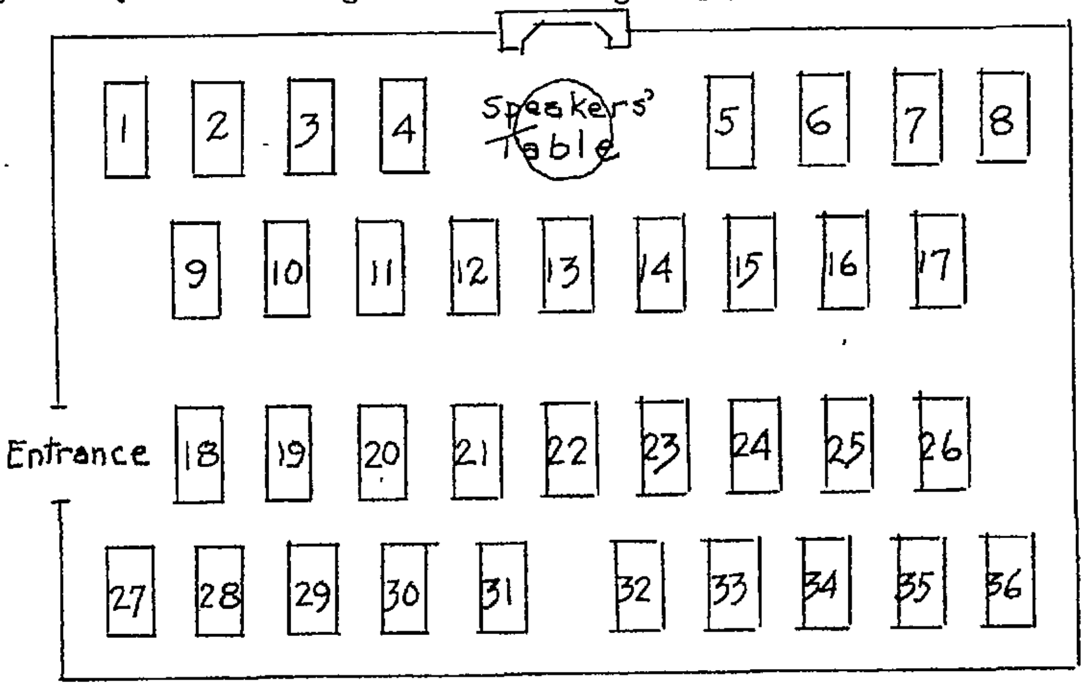
Tickets will first go on sale at the next meeting of the society. on the evening of Friday, January 14, 1938, Auditorium, Public Service Building. Tickets will be sold by the Ticket Committee - Carl Richards, Chairman, Mr. R. R. Poppleton, and Leo Simon. Tickets may be purchased at all subsequent meetings of the Society.

Mail orders should be addressed to
Carl Richards
1431 S.W.Park Avenue
Portland, Oregon
Money for tickets should accompany all mail orders.
Seat preferences will be made as closely as possible to your selection.

Tickets may also be purchased at any time at
Sowell - Simon Studios
531 S. W. Washington Street
Portland, Oregon.

This will be a "sell-out", so make purchases of tickets early.

Save a good geological specimen for the meeting, that you are willing to give away. You will get one in exchange for it.



Sec. 562, P. L. & R.

DR. ARTHUR C. JONES
2640 S. W. PATTON RD.,
PORTLAND, OREGON

GEOLOGICAL NEWS LETTER

Volume 4 Number 2
Jan. 25 1938

OFFICIAL BULLETIN
of the
GEOLOGICAL SOCIETY
of the
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Portland, Oregon

Edwin T. Hodge, Editor
2915 N.W. Luray Terrace,
Portland, Oregon

Raymond L. Baldwin, Business Manager
2725 N.E. 50th Avenue,
Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th
Yearly subscriptions. $2.00
All material for publication in the Bulletin should be sent to the Editor. Address all other correspondence regarding the Bulletin and changes of adress to the Business Manager.

LECTURES

Jan.28, 1938 (Friday) - Arthur M. Piper. Subject: "Features of Geologic Materials with Relation to the Occurrence of Ground Water". Mr. Piper is Geologist in charge of underground water investigations in the Pacific Northwest for the U.S.Geological Survey and is Chairman of our Research Committee.

TRIPS

Feb.20, 1938 (Sunday) - Mystery Trip
"The Three Musketeers", Leaders

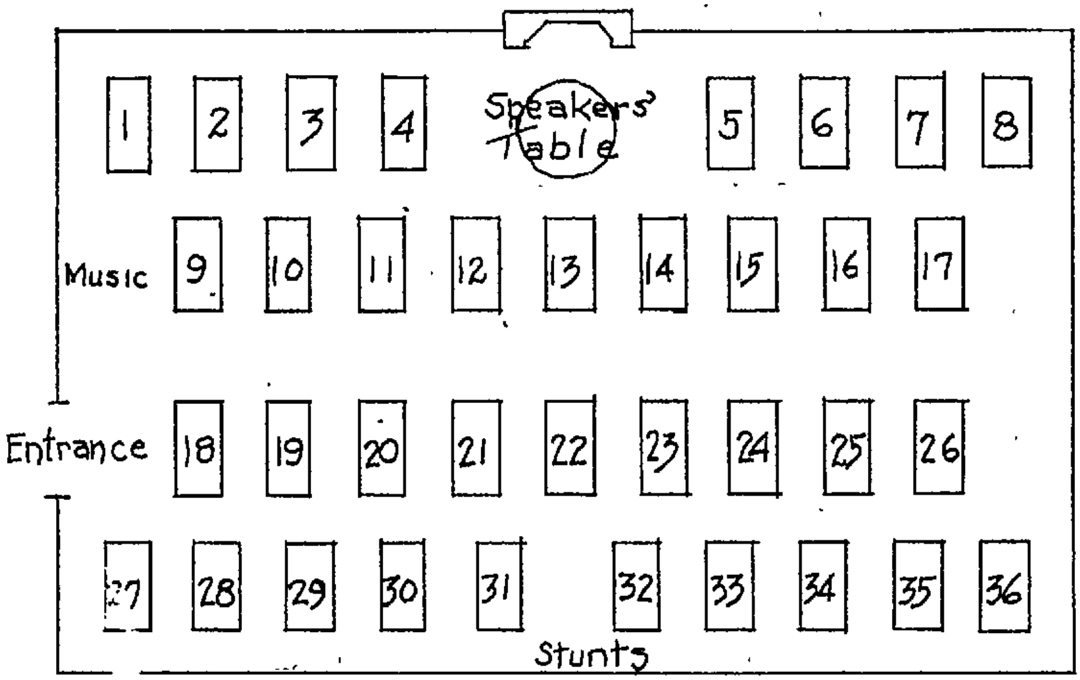
Mrs. Leo Simon, who was painfully injured when run into by an automobile, is resting easier. She is thinking that city pavements, especially around 4th and Alder Streets, are fully as hard as concretions found on our Buxton trip.

It is to be regretted that more cards were not turned in showing preference of members of Society for a summer camp. The cards have been tabulated and results show that the Wallowa Lake section was the first choice. The suggestion of choice for a summer camp was a gesture by this year's Exploration Committee to give the coming year's committee some idea of what the membership preferred as a place for a summer camp.

RECENT ADDITIONS TO OUR LIBRARY

Bulletin No.2 - "Progress Report on Coos Bay Coal Field", by F. W. Libbey; Oregon State Dept. of Geology and Mineral Industries.

"Snows of Yester Year", A Record of Snow Depths near Mt.Hood, by Kenneth N. Phillips; Beattie & Hofmann, Inc.
Donated by Mr. Phillips.



GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Annual Meeting and Banquet.

Friday - February 25, 1938 7:00 P. M. REED COLLEGE COMMONS
Places - $1.25 per plate.

You will have an excellent banquet, followed by stunts and entertainment, such as only the originality and ingenuity of the members of this Society can produce. You will hear music, monologs, dialogs, travelogs, and other "logs" (all of which are too recent to be petrified).

You will also hear that great maestro of the fourth estate, Phil Brogan of the editorial department of the Bend Bulletin, and an eminently qualified geologist in his own right, deliver in his own inimitable style, "Oregon's Ancient News Stories". He will cast himself in the role of a reporter of the ages--an eternal being with typewriter under finger, who has watched the Cascades in eruption, viewed miocene animals trek into the primeval John Day basin, recorded the massive movement of the Columbia basalts, observed Merychippus isonesus frolic on the Mascall horizon, and typed on his prehistoric typewriter the startling story of the sudden disappearance of majestic Mount Mazama. What a news story! Come and hear it!

This year the tickets are being sold by plat. Each purchaser may select the table at which he chooses to sit. Refer to the plat on the preceding page and make your selections, but make your purchace immediately if you want the best choice, although all tables are placed where everyone may hear and see. The stunts will not be at the speaker's table but on the opposite side of the room.

Tickets will be on sale at all meetings of the Society, Auditorium, Public Service Building. Tickets will be sold by the Ticket Committee--Carl Richards, chairman, Mr. R. R. Poppleton, and Leo Simon. Each table seats eight persons.

Mail orders should be addressed to
Carl Richards
1431 S. W. Park Avenue
Portland, Oregon

Money for tickets should accompany all mail orders.
Seat preference will be made as closely as possible to your selection.

Tickets may also be purchased at any time at
Sowell--Simon Studio
531 S.W. Washington Street
Portland, Oregon

This will be a "sell-out", so make purchases of tickets early.

Save a good geological specimen for the meeting, that you are willing to give away. You will get one in exchange for it.

THE CASCADE PLATEAU PROVINCE
Edwin T. Hodge
(continued from Jan.10, 1938 issue)

Were one living then and traveled from eastern Oregon westward to the coast, he would travel over many elongated ridges of folded rock which, in the vicinity of the Cascades, would be no different in appearance from the areas to the east or west. In other words, there was no Cascade Range then. These ridges were youthfully to maturely eroded, perhaps in middle Pliocene time.

So we come to the upper Pliocene at which date, 10,000,000 years ago, we shall date the birth of the present Cascade Range.

Explosive vulcanism similar to that of the Oligocene broke out along a great north-south belt from Mt. Rainier to Northern California. The belt of active vulcanism was located close to or exactly on the Oligocene volcanic belt and followed the above mentioned zone or "belt of weakness". (Fig.F).

The vulcanism was highly explosive and vast quantities of volcanic rock fragments, tuff and ash were erupted from thousands of central vents. The material was ejected in volumes too great for the streams to handle and it obliterated valleys and buried many hills. Valleys such as the Ancestral Columbia and other old drainage ways of the Cascades were buried. Streams flowing westward across the Cascades were buried and dammed and lakes (Condon) were formed to the east. In these lakes were deposited lake beds. To the west the streams deprived of the water supply were unable to carry their load of silt, sand and gravel, dropped it in their courses, aggraded their valleys until their debris formed a cover over many of the lower hills.

Within the Cascades, the volcanic pile formed a wind barrier which caught much rainfall and began the separation of humid Oregon from arid Oregon. The wash from the north-south volcanic pile was swept by torrential streams eastward and westward. The washing was so rapid and the streams so overloaded (in fact at times they were mud flows) that the debris checked pre-existing water courses and formed new ones. The streams shifted from place to place when crowded out of older courses by their own debris.

The deposits were spread east and west as huge piedmont fans. The material of the fans was the unsorted, poorly stream-worked volcanic material of the continually active volcanoes.

From time to time vulcanism was so intense that a complete blanket of tuff was spread over the entire country.

The deposits were laid on volcanic slopes, constantly raised higher, that inclined from the volcanic belt eastward and westward. Consequently the debris and volcanic tuff beds were laid in beds with initial dips either westward or eastward or locally toward any depression. As a result the beds lie parallel with older beds that dip east on the east side of the Cascades and have been mistakenly described as "folded with the basalts". To the west the beds dip westward in the same manner. Definite proof that the above is the fact is abundant visual evidence of these torrential beds lying athwart and against Coriba beds that dip north, south, or west beneath the eastwardly inclined initial dips of the torrential beds.

Hodge has called these beds that occur from Madras south the Madras and from Madras north The Dalles formation on the east side of the Cascade Mountains. Thayer has called the beds on the west side of the Cascades in the Santiam basin the "Fern Ridge" and Hodge has named the same beds "Rhododendron formation" in Middle Fork, McKenzie, the Calapooya, the Santiam, the Clackamas branches of the Willamette and the Columbia Gorge.

On the west side of the Cascades and from Stayton north into Washington just prior to Rhododendron time, streams carried from sources in part, unknown metamorphic and mineralized water-worn gravels. Some of the gravels are rich in quartzites. Some of the well-worn quartzite gravels are glacially faceted; other gravels are burnt by volcanic blasting and some are split by quick volcanic heating and chilling.

The best exposures of these gravels lie in the troughs of the old valleys. Since the gravels show glacial effects and because they lie under the Rhododendron formation, it is concluded that the Rhododendron formation is in part early Pleistocene.

There are places in some parts of the Cascades as at Bohemia, Quartzville, and elsewhere, where mineralized lavas occur that appear to be older than the above and if so, are probably related to the initial stages of the upper Pliocene vulcanism.

In Oregon, in the Cascades, there appears to be no dividing surface between the Pliocene and Pleistocene. The Pliocene vulcanism continued uninterrupted into the Pleistocene beginning about one million years ago. However, its character changed from explosive to quiet emission of lavas.

If the pyroclastics and their washed products did not dam older stream courses the lavas did. The pyroclastics did not cease eruption by giving place wholly to vented lava flows. On the contrary lava flows occurred intermittently through the entire period, becoming common at the close and dominating the igneous activities throughout the Pleistocene.

The lavas were once called the Mount Jefferson formation near Mt. Jefferson and the Three Sister Region and the Cascade formation elsewhere, and later (now) the Cascan formation by Hodge.

These lavas are mainly andesites including some olivine basalts, dacites, and trachytes. The lavas formed a great elongated volcanic pile which is the Cascade Range. It is not made of folded rocks but is a simple huge accumulation of lavas, thickest in the center and wedging out east and west. Though the volcanoes were so close that they formed a single volcanic mass of lavas, some volcanoes erupted so far to one side or the other that they stand alone, 10, 20, to 30 miles west or east of the main mountain mass. Sylvania, Tabor, and Rocky Butte are examples.

Some geologic students find difficulty in accepting such a vast outpouring of lava within a part of the Pleistocene. However, an even greater mass of lava was outpoured in the Middle Miocene. Also a million years is a long time and many things can be done by Nature in so vast a period of time.

Erosion of the mass of lava did not wait till its completion but started contemporaneously. At an early date Condon lake, the dammed ancestral Columbia River was diverted over the new lava surface in a natural trough and joined with the much older Willamette River. The diverted Columbia River cut its present Gorge. In so cutting it fortuitously cut down in places on buried hills and on volcanic necks. The Gorge has been cut so recently that its instable walls are still landsliding into it.

Elsewhere the streams cut valleys down the slopes. Such valleys were in many places blocked by later vulcanism. For example the Santiam at one time flowed from the Three Sisters but its upper portion has been blocked off by the Belknap lava and its upper part turned south into the McKenzie River.

The stream flowed over a constructional surface capped mainly by lavas and underlain by tuffs and water worked volcanic materials, interbedded with lava flows. In cross sections the Cascade Range, then, could be divided into five parts. Part one forming the central core consisted of a triangular pile of more or less consolidated weak volcanic ashes and tuffs surmounted by an A-shaped or saddle-shaped thick mass of consolidated, resistant lava flows. Together they form the central ridge.

To either side of the above lie zones 2 and 3 formed by thick beds of wash material in part water washed and capped by thin lavas. The lavas though close to their source, nevertheless flowed down a slope and being liquid flowed east or west beyond the slope area. The underlying softer material was either blown by wind or carried by water and was unloaded in progressively decreasing amounts from the source eastward or westward.

To either side of 2 and 3 are marginal belts 4 and 5. To these belts wind and stream were able to carry only small quantities of unconsolidated material. On top, however, the liquid lavas flowed to these areas of low slope and there formed, next to the central belt, the thickest lava layers.

The streams cutting down were incised in very thick resistant lavas in belts 1, 4 and 5 and thin lavas in belts 2 and 3.

In belts 2 and 3 the thin lavas were exposed to all the erosive effects of high elevation in addition to the full velocity of water descending from belt 1. Belts 4 and 5 were exposed to the much gentler erosion of low elevation and only to erosion by water flowing on gentle slopes and reduced in energy by the heavy load.

Hence the streams would require a long time to cut through the thick lavas of belts 1, 4 and 5 and would easily cut through the lavas of belts 2 and 3. In belts 2 and 3 after cutting through the lavas the easily eroded thick beds of pyroclastic material would be exposed to erosive attack.

Now the streams on the west side of the Cascades receive 60-120 inches of rainfall in their drainage basin compared to the 10-40 inches on the east side of the mountains. The western streams have, therefore, cut great canyons, trimmed off the edges of lava flows and so produced rugged steep western face to the range beyond which extend large valleys.

The western streams, therefore, in the aforesaid belts 2 and 3 have cut through the lavas into the easily eroded material. In the latter material these branches have turned north and south in the soft stuff, made a flanking attack, and worked rapidly north and south. As the branches worked north and south they beheaded less favored west flowing streams and stole their main water supply. By such method they gained control of the great volume of water coming off the central part of the Cascades. Hence success in access to easily eroded material abetted further success so that certain upper tributaries of the Clackamas, Santiam, McKenzie, Middle Fork and Umpqua and Rogue Rivers line up nearly north and south. These tributaries have eroded here an inner mountain low area and almost divided the Cascade Mountains into two parts. The eastern part consists of the central mass and its little dissected eastern slope. The western part consists of the western slope cut by deep valleys which separate lava uplands so undissected that they have been called a "peneplane".

South of Medford and into California the western part of the Cascades was laid down upon the eastern flank of the Klamath Mountains. The eastern flank is made of soft material. Hence the lowlands here are due to streams entering into and eroding such soft material or are relict lowlands incompletely filled by Cascade lavas.

Vulcanism continued especially in the central part of the Cascades. The author has made a study of volcanoes erected on the Cascade surface and found volcanoes of so great an age that they are nearly eroded away (Theilsen) grading down to volcanoes so young that they might have been built yesterday (Middle Sister).

Many formational names have been given locally to the lava and pyroclastics produced by the vulcanism, post-dating the building of the main Cascade volcanic pile. Among these are the great phalanx of volcanoes that stand upon the volcanic Cascade pile like a file of soldiers, young, vigilantly alert and (apparently) ready to fire their great volcanic cannons instantly upon warning from Nature. Such are Baker, Rainier, St.Helens, Adams, Hood, Jefferson, Washington, Multnomah, Batchelor, Diamond, Mazama, McLoughlin, Shasta and Lassen.

Glaciation may have been contemporaneous with the building of the main volcanic pile. In support of this, perhaps, are upper valley troughs, wider than the present valleys and into the bottom of which the present valleys are cut. Such high-level valleys are found chiefly on the west side of the Cascade Mountains. Their profile is U-shaped and they may have been due to glaciation.

Also there is evidence that glacial ice moved across surfaces onto upland levels that are now separated from the Cascade axis by deep north and south valleys as at Grizzly Flat west of Jefferson, Bull Run Valley, west of Mt. Hood, and east of Hood River Valley east of Mount Hood. Obviously glaciation on a large scale preceded the cutting of the main portion of the present valleys. Also glaciation preceded the building of the major peaks of the Cascades because at Hood, Jefferson and Three Sisters a glacially scoured rock surface passes beneath these lavas.

Long ago the writer gave the name "Cascadian" to the early glaciation, "Willamettian" to an interglacial stage and "Jeffersonian" to a later glacial stage. However, it is now known that such terminology is insufficient.

After the first glaciation took place the valleys were cut deeper. Down these valleys glaciers descended to the Columbia in Hood River Valley to the Columbia in Sandy Valley, for 30 miles and to an elevation of 1000 feet down the Santiam and to Belknap Springs in the McKenzie Valley.

After the retreat of the first valley glacier the ice descended two additional times but to lesser distances in the valleys.

Counting the above four with the present makes five ice stages.

Between the ice stages the climate changed. For instance, on Mt. Hood above 9500 feet is the remains of a large rain forest. Two-foot trees are still rooted and must have grown when the climate at that high elevation was milder than at present.

The descent of the ice obstructed the streams, diverted, and superimposed them across rock valley spurs.

Lavas also descended the valleys or flowed across them and deranged the drainage and produced lakes; many of the lakes at high elevation were so formed.

Volcanic activity of the Cascades has persisted down to the present time and many of its younger volcanoes may be only dormant. Glaciers also still thrive on the higher mountains.

The last period of major folding in the Cascades was at the close of the middle Miocene. All deformations claimed by others as of later date are considered to be depositional or initial by the author. However, there is evidence along the northern border of the State of Oregon that at a very recent date a hinged door depression occurred with the maximum depression at the Coast and the zero in the vicinity of Hood River -- or close to the zone of compressed folds and the great fault. Since the depression there have been several uplifts and additional depressions. The maximum uplift **at** the coast was over 1500 feet.

To what extent the region to the south partook of these movements is unknown. However, stream terraces, rock cut benches, planned rock benches, and valley-way fills all suggest some correspondence.

The result of all of the above, so briefly stated, is summarized in the following plate (Fig.X).

SOILS

Volcanic formations when thoroughly weathered generally produce excellent soils. There are numerous areas, not covered by recent flows and pumice, which have under the action of copious rainfall and disintegration by frost become excellent soils. Owing to the ruggedness of the terrain these are generally limited in size. Also due to the altitude, they are for the most part not well suited to the growing of crops, except the all important one of trees. Over much of the high country, too, there is a blanket of pumice which yields a very unsatisfactory soil. This is particularly true of the Southern Cascades in the vicinity of Crater Lake.

RESOURCES

Agricultural Products:

Aside from the few intramountain valleys of relatively small size, except close to the Willamette Valley, farmlands are relatively scarce in this province. In such valleys as the Santiam, McKenzie, etc., one finds some valuable farm lands in the several old river terraces bordering these streams and here are located small farms of diversified crops of fruit and garden produce.

However, it is believed that one of the chief soil products of this region are the grasses which provide pasturage for livestock driven up from the dry lowlands in the summer months.

Livestock:

As indicated in the preceding paragraphs the Cascade region provides excellent summer range for bands of sheep, cattle, and a few horses.

Forest Products:

Lumbering is at present the chief industry in Oregon and the bulk of merchantable timber of the state is found growing within the confines of the Cascade province. A great deal of this timber is in the National Forests of which there are:

			Est. B. M.
1.	Mount Hood National Forest		
	Est.Board feet of timber	1,159,729 acres	14,000.000
2.	Santiam National Forest		
	Est.Board feet of timber	723,823 acres	12,000.000
3.	Cascade National Forest		
	Est.Board Feet of timber	1,221,391 acres	23,000,000
4.	Umpqua National Forest		
	Est.Board feet of timber	1,221,391 acres	23,000,000
5.	Crater Lake National Forest		
	Est.Board feet of timber	1,107,672 acres	8,000,000

The total estimate of board feet of all these forests, government and private, is 80,000,000.

In the Western Cascades the principal trees are fir, spruce and cedar, while east of the mountains ponderosa pine is the dominant species.

During a normal year the cut from this region would be approximately 1,500,000 board feet.

Other forest products of importance might be cited, such as: chittam bark (cascara); moss for nursery purposes; bows made from the yew trees, said to be of exceptional quality; and wild berries.

However, the chief value of the forests, aside from the timber, is to be found in its roles, first as conserver of water and soil, and second as recreational areas. Their value in these capacities cannot be estimated, for they are incalculable.

It is to be hoped that the Forest Service's policy of sustained yield from this most valuable of Oregon's crops will be generally accepted. Destruction of the forests will mean ultimate ruin not only for the lumber industry, but for many other industries as well.

Mineral Deposits:

In a region comprising relatively young volcanic rocks the quantity and variety of minerals of economic importance could not be expected to be great. However, the Cascades do have some mineral deposits of value and more may be discovered in the future. The known mineral deposits include the following: gold, silver, lead, zinc, copper, mercury, fire clay, calcite and some sulphur.

However, the only minerals that have been of any commercial importance up to date are gold, silver and cinnabar.

In the Cascades there are the following mining districts: (from north to south) Quartzville, Blue River, Bohemia and Black Butte.

There is little activity to be noted in the first two compared with former years. The third district is by far the largest district and the most active, there being several mills in operation and other mines developing. In the fourth, there is really only one mine at present but it is by far the most substantial quicksilver mine in the state, so that it deserves special mention. All these metal deposits in the Cascades appear to be in the older andesites either in the form of well-defined quartz veins or, as in the case of cinnabar, as irregular stringers and disseminations in highly altered andesites. It is highly probable that these metals have come from considerable depths from deep-seated intrusive rocks which are more or less concealed by the later lavas.

In the main the ores are basic, in the form of sulphides and need smelter treatment, though some fairly rich pockets of "free" gold have been secured in workings near the surface.

It is not entirely improbable that at least one good deep mine may be opened up within this area at some future time whenever adequate capital is forthcoming to pay for substantial exploration and development.

A recent gold excitement in the foothills east of Cottage Grove in the so-called Winberry District where the country rock is dominantly volcanic tuff seems to hold little promise. What this entire region needs is more substantial development by qualified mining men and fewer "wildcat" propositions.

The other minerals, sulphur, fire-clay, etc., are quite undeveloped and are more or less problematical in value.

Fish and Game:

The Cascades include some of the best known fishing and hunting areas of the Pacific Northwest, the McKenzie River being one of the famous fishing streams of the United States. Other streams, perhaps, equally as important in this respect are the Rogue and the Umpqua. Some of the lakes, such as Klamath Lake, Crater, Odell, Davis, Crescent and Elk are highly rated in this regard. The Fish and Game Commission maintains many hatcheries for the restocking of most of these bodies of water. Trout, steelhead and salmon are the principal fish.

This is the greatest hunting section of the state and one of the most important in the western part of the United States.

Elk: The largest of the game animals in this province is the elk. The only animal census of the region is the Forest Service reports, as a great part of this province is covered by national forests. From these reports we find that there are between a thousand and fifteen hundred elk in the province. They are protected permanently in most sections but season is open on them for a few days each year in the districts where they are most plentiful.

Deer: The most numerous of the game animals. In the province there are in the neighborhood of twenty five thousand deer, most all of these being of the black tail variety. However, there are about one thousand mule deer. The mule deer is much larger and is found on the eastern slopes of the Cascades.

Bear: There are approximately two to three thousand in this province but they are not hunted as much as the other game animals, and in some sections they are protected. They are not as much sought as their meat is not as desirable as that of the deer and most of them are killed for their fur.

Among the fur-bearing animals there are varying numbers, difficult to estimate, of beaver, fox, martin, badger, weasel, fisher, otter, coon, skunk, muskrat and civet cat.

Predatory animals on some of which there is a bounty are: coyote, lynx, mountain lion or cougar, and porcupine.

IV. - Development

Since most of the industries located within the Cascades are of the extractive kind and result in many cases in ruthless destruction not a great deal can be said for the areas under private ownership. When it comes, however, to the areas under Government control, such as the National Forests and Crater Lake National Park the story is quite different. What with the policy of sustained yield in the forests and the development of a great number of recreational areas, the picture presented is rather discomforting to those who subscribe to the old laissez-faire doctrine of "boom and bust". Ghost mining and lumber towns are not a credit to any civilization. Much of the fine development taking place in this mountainous region is due to the highways and other roads being built by both Federal and State Governments. The recent establishment of the C.C.C. camps within the forests has been one of the most encouraging developments resulting from the depression in business.

The principal recreational areas within the province are as follows: Winter sports: Mount Hood, Upper McKenzie and Crater Lake. Fishing lakes: Odell, Diamond, Lake o' the Woods, Crescent, Suttle, etc. Rivers: Rogue, Umpqua and McKenzie. Hunting and scenery: All the High Cascades, but especially Mount Hood, Mount Jefferson, Three Sisters Primitive Area, Crater Lake National Park (no hunting), and Skyline Trail.

In addition to these there is a number of well-known Hot Springs resorts such as Mount Hood Mineral Springs, Belknap, Foley, McCredie, etc. Judging from the development within the region within the past few years and owing to the many favorable features possessed by the Cascades, such as the magnificent forests, clear rushing streams, excellent fishing and genial climate, this bids fair to become one of the chief summer playgrounds of the nation.

CITIES AND TOWNS

The largest city within the limits of this province as defined here, though it is not in the mountain area, is Klamath Falls in the extreme southeastern corner. This is a thriving city of 16,093 (1930) inhabitants whose chief activities are in lumber manufacture, dairying and diversified crops, of which potatoes are one of the principal crops. The city is on the main line of the Southern Pacific Railroad and is also on one of the trunk highways, The Dalles-California, of the State Highway System. Fine recreational areas are within easy reach of this city.

Hood River: Again, this city, like Klamath Falls, is not strictly within the mountainous portion of the province. It is situated in a beautiful intermountain valley, on the Columbia River at the junction with the river of the same name. Hood River, owing to its fine soil, equable climate and sheltered location is one of the finest agricultural areas in the state with apples as the chief crop. As a result of all the favorable features to be found in this location we have here one of the most forward and progressive communities in the entire state. The population of Hood River in 1930 was 2,757.

Other places of town rather than city size are Oakridge on the Middle Fork of the Willamette River, a lumber town, and Sisters, just east of the summit, a junction point of two important highways, the McKenzie and the Santiam.

All other communities in this province are of village size. In the winter months they naturally shrink in number of inhabitants but in summer many of them boast more people than some of the larger valley towns.

PLACES OF ESPECIAL INTEREST IN THE CASCADE PROVINCE

1. The Columbia Gorge: The Columbia River has cut entirely through the Cascades and has exposed one of the most interesting geological sections in North America. Stupendous cliffs, scores of water falls, one (Multnomah) having a vertical drop of 620 feet, and forest-clad slopes make this one of the most spectacular and beautiful stretches of river country in the world.

With the completion of the Bonneville Dam, 42 miles east of Portland, reached by way of the famous Columbia Highway, this part of the province promises to become attractive not only to the tourist but to the industrialist as well.

2. Mount Hood: Oregon's loftiest mountain peak lies only 22 miles south of the Columbia and is easily reached by the Mount Hood Loop Highway from the Columbia Highway. This mountain of andesitic lava is a dormant volcano, still showing fumaroles at one point (Crater Rock), 11,225 feet in elevation. It has eight distinct glaciers on its slopes, the largest being Eliot glacier. This mountain being within easy drive from Portland has become both a summer and winter playground for thousands. An attractive year-round lodge, Timberline Lodge, and ski courses have recently added much to its value in this respect.

3. Mount Jefferson: This pyramidal shaped mountain is 10,522 feet in elevation, dominating the Jefferson Park area, and is considered one of the most beautiful of Oregon's glacier-clad peaks. It has five distinct glaciers on its shoulders which are chiefly responsible for its pressnt shape instead of the original volcanic cone.

4. The Three Sisters Primitive Area. Very close to the midway point of the range is situated this primitive area, considered by some the most interesting in the entire state. Because of its very recent lava flows, cinder cones, the Three Sisters, all over 10,000 feet, numerous glaciers, one (Collier) the largest in Oregon, many beautiful lakes and forests, it has attracted tourists, geologists and sportsmen of all kinds. It is gratifying that the Government has finally set this aside for all time as a Primitive Area.

5. Mount Thielsen and Diamond Lake. This needle-pointed peak and the beautiful lake at its foot yearly attract thousands of tourists. Mount Thielsen is an old volcano in an advanced stage of dissection and is especially interesting to the geologist.

6. Crater Lake. This world-famous body of water has attracted visitors from all parts of the world to the number of several thousand in a single day. The marvelous blue lake 21 miles in circumference and approximately 2,000 feet deep lies in a crater formed by the cataclysmic destruction of a pre-historic mountain which has been posthumously named Mount Mazama. Explanations differ among geologists as to the origin of this crater, some supporting the view that collapse and engulfment of the superstructure of the mountain occured, while others lean to the view that a Krakatoan explosion is the more acceptable explanation.

Whatever the origin, this is one of the world's great scenic masterpieces and the enjoyment of its beauty need not depend upon accepting either view. Perhaps a combination of the two will finally come to be taken as the true explanation.

7. Mount McLoughlin (Mount Pitt). The southernmost high peak in the Cascade galaxy of old volcanic mountains is this one near the end of the range in Oregon. It is the most perfectly symmetrical mountain in the State and one of the best examples of a composite volcanic cone in North America. Its elevation is 9,493 feet.

8. The Skyline Trail. A good horse trail runs close to the crest of the entire Cascade Range and a trip along this will bring to the traveller who follows it to many places of scenic interest and grandeur in addition to the more spectacular ones noted in the foregoing list. Some of these are small park-like places, true alps, water falls, emerald lakes, noble forests and minor volcanic features of many kinds, providing an ever-changing panorama of natural beauty.

In addition to the above we should note the following resorts available to the vacationist: Crescent and Odell Lakes resorts; Metolius resorts; Diamond Lake resort; Suttle Lake resort; Elk Lake and many others.

Sec. 562, P. L. &

DR. ARTHUR C. JONES
2640 S. W. PATTON RD.,
PORTLAND, OREGON

GEOLOGICAL NEWS LETTER

Volume 4 Number 3
Feb. 10 1938

OFFICIAL BULLETIN

of the

GEOLOGICAL SOCIETY

of the

OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Portland, Oregon

Edwin T. Hodge, Editor
2915 N.W. Luray Terrace,
Portland, Oregon

Raymond L. Baldwin, Business Manager
2725 N.E. 50th Avenue
Portland, Oregon

Bulletins issued semi-monthly on the loth and 25th
Yearly subscriptions. $2.00
All material for publication in the Bulletin should be sent to the Editor. Address all other correspondence regarding the Bulletin and changes of address to the Business Manager.

LECTURES

Feb.11, 1938 (Friday) - Dr. Edwin T. Hodge. Subject: "The Origin of Grand Coulee and the Washington Scablands".

--

ANNUAL BANQUET.

Feb.25, 1938 (Friday) - Annual Banquet, Reed College Commons. See pages 4-5 for further details.

TRIPS

Feb.20, 1938 (Sunday) - Mystery Trip. Leaders: The Three Musketeers.

DUES

Dues are now payable, - make check payable to The Geological Society of the Oregon Country. The new fiscal year begins March 1st.

NEW MEMBERS

L. C. Burke,
110 Center Street,
Oregon City, Oregon.

M. H. Calef,
2405 N.E. 41st Ave.,
Portland, Oregon.

Arthur M. Swartley (renewal)
State Department of Geology and Mineral Industries,
704 Lewis Building, Portland, Oregon.

****

Oregonian, Monday, January 23, 1938: Dr.Claude W. Adams will give an illustrated slide lecture on geology along Oregon's highways before a dinner meeting of the Gresham Kiwanis Club, at 6.30 P.M.

****

REVIEWS

"Human Relations to Northwest Geology," by Prof. Otis W. Freeman of the College of Education, Cheney, Washington; Scientific Monthly, February, 1938.

The current issue of Scientific Monthly contains an interesting contribution entitled as above. The article gives an outline of the formation of the geological features of the Oregon Country in brief order. For Oregon, the article discusses, among other things, the formation of the Cascades and the history of the major peaks; the origin of the Columbia Plateau lava flow; Snake River Canyon; and Oregon Caves.

In Washington, the writer discusses the origin of Puget Sound; Mt. Rainier; the formation of Grand Coulee and the scablands, - the latter a subject which Dr. Hodge is to discuss at our forthcoming meeting. The enormous floods to which the writer refers in this connection brings up a mooted question in the minds of many. In Idaho, Montana, and Wyoming, he presents outstanding geological features, such as Crater of the Moon, Salmon River, Yellowstone National Park, and earthquakes are briefly discussed.

While it does not add new material to the existing knowledge in the field of Northwest Geology, it does discuss in a most entertaining fashion these natural features, and particularly in their relation to the development of the Oregon Country as a dwelling place for man. It will repay the time and effort of our members to read it. As an interesting sidelight, the author states in speaking of Crater Lake that it never freezes. There should be an authoritative article on this subject.

- F. C. Davis

****

ERRATA

Vol. 4, no. 2, page 22 -- all board feet figures should be multiplied by 1000. This is a regrettable error, and our apologies to Dr.Hodge are in order.

****

Dr. Osgood Has Technical Article Published

The Journal of the American Medical Association Releases Data on Sulfanilamide

"Culture of Human Marrow; Studies on the Mode of Action of Sulfanilamide"

In the January 29th issue of the Journal of the American Medical Association, there appears an article by our fellow member, Dr. Osgood. The article is found on pages 349-357, contains two tables and four plates. The following summary is given at the end of the article:

"The major action of sulfanilamide on the beta hemolytic streptococcus seems to be neutralization of the toxins. Either because of this action or incidentally it also decreases the rate of cell division of this organism. It appears not to kill these organisms directly, although it does permit the bactericidal properties of human serum and to some extent phagocytosis by leukocytes to kill organisms which they otherwise would be unable to kill. It has no direct effect on phagocytosis.

The effective concentration of sulfanilamide would appear to be about 1:100,000 or only one-tenth of that now ordinarily maintained in the blood stream, but this experimental observation requires confirmation by carefully controlled experiments on large numbers of human infections before it is justifiable to employ smaller dosages in dangerously ill patients. Sulfanilamide in concentrations even greater than those generally employed clinically does not appear to have direct toxic action on the nucleated cells of the majority of bloods or marrows. This does not exclude the occurrence of an occasional idiosyncrasy in the reactions of these cells such as is known to occur for other benzene ring drugs.

The possible effectiveness of and the mode of action of sulfanilamide on all other organisms known to produce human disease should be determined by the methods here described as soon as possible. Cultures of human marrow should aid materially in the study of the mode of action of both noxious and therapeutic agents."

Dr. Osgood's article is discussed editorially on pages 372-373 of the same issue. This Journal is never at a loss for articles submitted for publication and space is at a premium. The quality of Dr. Osgood's work is attested by this allotment of space.

On page 392 of the same Journal, Dr. Osgood's new book, "Atlas of Hematology", is reviewed, and we quote from portions of the review:

"Atlas of Hematology. By Edwin E. Osgood, M.A., M.D., Assistant Professor of Medicine and Head of Experimental Medicine, University of Oregon, Medical School, Portland, and Clarice M. Ashworth, Medical Illustrator, University of Oregon Medical School, Portland. Cloth. Price $10. pp 225, with 325 illustrations. San Francisco: J. W. Stacey, Inc. 1937."

"The book represents a great deal of painstaking effort both by the junior author, who is responsible for the colored plates, and by the senior author, who supplied the text material and did the editing. The colored plates are well done, and, while they lack the skill of color photo-engraving of well known European atlases, they will serve most efficiently the purpose for which they were intended. Not many atlases of hematology contain so many colored plates showing the variety of cells of the various series. This book should serve the physician, medical student and technician well in their venture into the field of hematology, although few hematologists or those who have had experience with hematologic work will share the senior author's rather optimistic view that this book, a microscope and a patient will solve a large part of the vicissitudes of hematology. It will, however, provide a great deal of highly desirable information which most students and physicians will enthusiastically welcome. It deserves a place in every library."

Our congratulations to Dr. Osgood on the results of a fine piece of research work which will be a distinct benefit to the suffering public, and also congratulations again on the fine notices and reviews on his book.

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Annual Meeting and Banquet.

Friday - February 25, 1938 7:00 P.M. REED COLLEGE COMMONS

An excellent banquet is being prepared for this event. Many of the places have been taken, but there are still places available. On the plat of the room showing the tables, those places that are already taken are marked with an "x". The room, however, has good acoustics, and there are no posts, and every seat in the room will afford an opportunity to see and hear all. The stunts and musical numbers will be at different places in the room from the speaker's table as indicated on the plat.

Among the stunts of the evening will be many whichmanifest the originality which has always characterized the members of this Society in past events of this kind. You will hear Dr. Osgood give some of the tall tales of which only he is capable. Mr. Bruce Schminky will show some of his finest natural color motion pictures of some of the activities of the Society during the past year. Drs. Adams and Abbott will display some of their originality. Mr. Homer Siegfried will entertain us with tenor solos. You will see and hear weird displays of mesmeric neolithic manifestations.

Those who are interested may bring geological specimens and "swap" them, "sight unseen", for others. If you bring a specimen you are requested to wrap it. When you deliver it to the ushers you will get a number in return for it. During the course of the evening, you will be given an opportunity to receive your exchange specimen. Numbers will be given only to those who desire to participate in this by bringing a specimen.

The high spot of the program will be the address by Phil Brogan, of the Editorial Department of the Bend Bulletin. He is not only a distinguished newswriter and an excellent speaker, but is a geologist of some reputation. He has written many articles upon the geology of Oregon, particularly of the Eastern Oregon Country in which he resides. Many of his articles have been published in nationally known scientific magazines. He has gathered much of his geological knowledge by exploration and scientific research in the regions of Oregon of which he will speak. He has collected fossils for many institutions, and travelled and worked with many distinguished scientists..He will assume the part of a news reporter actually working in by-gone ages, vividly protraying the great events before the dawn of written history, in a kaleidoscopic manner which will live in the memory. Try to imagine the newspaper headlines which could be written of such an event as the eruption (or collapse) of majestic Mt. Mazama, or reports from the back country that hundreds of volcanoes were changing the landscape with hot flowing lava. This meeting promises to be another delightful occasion.

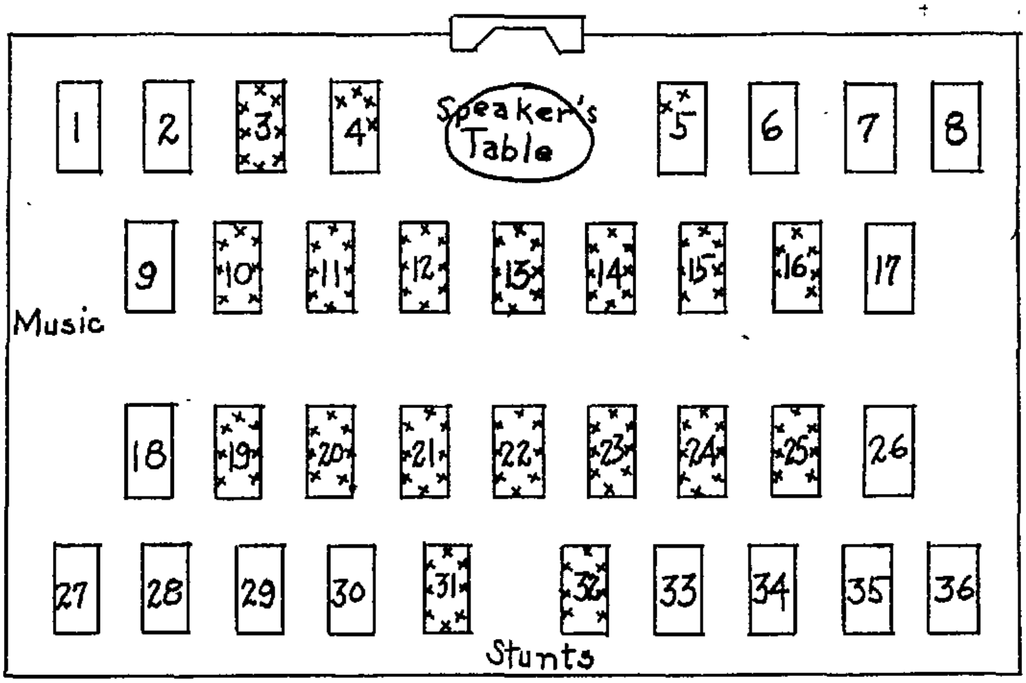
Seeking the greatest ease and comfort for all, dress will be informal. Feeling that some may have special tastes or inclinations, it has been arranged that those who prefer fish instead of meat course, may do so. However, it will be necessary to make your preference for fish known to one of the ticket sellers before February 18, 1938, in order that proper provision may be made. We would also like to know the number to be present by that date, so please make your reservations as soon as possible.

The entrance to the campus is on East Woodstock Avenue at Reed College Place. The road on the campus leads directly to the Commons. Eastmoreland Trolley Coach stops at the entrance to the campus for those who use the public transportation system.

Tickets may be purchased from Leo Simon, 531 S.W.Washington Street, at any time.

Mail orders for tickets should be sent to Carl Richards, 1431 S.W.Park Avenue, Portland, Oregon.

Refer to the plat for purchase of tickets.



NEW WRINKLES FOR GEOLOGISTS.

Ward's Mineral Bulletin, January, 1938, contains a short article on a method of trimming and preserving fragile crystals. Briefly, the method is to pour in and around the crystals, melted paraffin which acts as a cushion. The specimen can then be safely trimmed. This method is also excellent in preparing fragile crystals for shipment. The paraffin is removed by placing the specimen in cold water, bringing the water to boiling. The paraffin will melt, rise to the surface and can be removed and saved.

Specimens of Jurassic Plants from Oregon are advertised. They are in the form of slabs each of which usually contains more than one specimen.

This same Bulletin also announces a 60-page Merit Badge pamphlet entitled "Rocks and Minerals" by Dr. Daniel T. O'Connell, Assist.Prof.Geol., College of City of New York. This pamphlet is issued by the Boy Scouts of America, 2 Park Ave., New York, or from local Boy Scout suppliers especially for the new Merit Badge series of the Boy Scouts.

NEWS-LETTER GETS NATIONAL PUBLICITY.

The Geological Society of the Oregon Country has received national recognition of its Geological News Letter by way of U. S. Geological Survey Bulletin 892 entitled "Bibliography of North American Geology 1935-36". Similar publications are released every two years and contain bibliographic references to all published articles pertaining to geology.

Copies of our Geological News Letter are filed with the U. S. Geologic Survey and these have been considered by the Survey bibliographers. Many of the articles appearing in the News Letter are listed in the Bibliography. Thus we can feel that our Society is contributing to scientific literature, and also that the authors of articles in the News Letter have an incentive to make their articles worth while.

NORTHERN CLARK COUNTY - FARGHAR LAKE - TUM TUM MOUNTAIN.

Leader: Claire P. Holdredge.

The caravan left Portland 8.30 on Oct.23, 1937, and made the first stop at Salmon Creek, 6 miles north of Vancouver, to pick up the leader. Continued on up the highway about one mile and turned east, crossing a low north and south ridge. A short stop was made just over the summit of this ridge to point out various things of interest and to discuss certain features of the topography. The hill is said by well drillers to be underlain by cemented gravels which we interpreted to belong to the Troutdale Formation. To the east of the ridge we saw a wide flat valley from east to west cutting through the ridge upon which we were standing about a mile to the south of us. Streams also run north from this valley into the East Fork of Lewis River. Well drillers say that in places the valley is underlain by lava below a thin covering of sand and gravel. The lava is less than 100 feet thick and is underlain by cemented gravels presumably of the Troutdale Formation. It must have come from Battle Ground Lake which is apparently a crater and the hill upon which we stood must have been in existence at that time. To the north of us the ridge sloped gradually down to the level of the plain and a series of swales cut across to the northwest from the valley to the east of us. Little or no water runs in these swales at present. It is probable that the valley to the east is floored with sediments left there by the so-called Spokane Flood and that the swales are erosional features left by the same agent. Well drillers say that to the north and west of the north end of this hill, as far as the East Fork of Lewis River, in the one case and the Columbia River in the other, the cemented gravels of the Troutdale Formation (?) are not present at depths of over 500 feet.

From this point we proceeded north and east across the plain to the East Fork of Lewis River at Daybreak. En route we crossed several of the aforementioned swales. As we descended into the valley of the East Fork, which at this point is wide, flat-bottomed and steepsided, we stopped to observe a deposit of gravels which forms the south wall of the valley and which is exposed in the road cut. These gravels contain a liberal sprinkling of quartzites many of which are faceted. They also contain pebbles of basalt and andesites as well as other pebbles derived from local and foreign rocks. The matrix is largely micaceous sand. The question arose as to the age and the presence of decayed lava pebbles, the degree of compaction and the general character of the deposit led to the conclusion by most of the party that it is probably Troutdale in place rather than later deposits comparable to the Portland Delta. We were able to note faceted pebbles in place and the facets were not confined to the upper side of the pebbles in place. This indicated that the pebbles were probably faceted before being deposited at this point.

We descended into the valley and crossed to the bridge over the East Fork which runs on the north side of the valley at this point. Under the north end of the bridge we examined a deposit of poorly consolidated, massive bedded, flat-lying, micaceous sandstone. We then crossed the river to the south side and assembled on the gravel bar for a discussion. From this point we could see a fine section of this sandstone exposed on the north side of the river. On top of it were two gravel terraces. In the discussion many different opinions were expressed. Some thought that these sands were comparable to the deposits of the Portland Delta or later; others compared them in age with the Rhododendron Formation; but

Treasher (who had brought no lunch in spite of the fact that Mrs. Treasher had gotten up from a warm bed to prepare one for him) thought these sands might be of Eocene age and compared them with similarly loosely consolidated sands of that age found in the vicinity of Kelso. Further argument pointing to this age was cited as the occurrence of leaf beds of probable Eocene age at Heisson only a few miles east of this point. The question was left unanswered but Treasher (in spite of worrying about his lunch, to say nothing of what he would say to Mrs. Treasher when he got home) definitely had the best of the argument.

We returned to the south side of the valley and climbed out of another road a little farther east noting more gravels. We continued eastward a few miles and then turned north towards the East Fork again. As we neared the valley we stopped at an outcrop of lava along the road. This lava proved to be basaltic and comparable to that found at Battle Ground Lake, Fishers Quarry and Kelley's Butte. As we descended into the valley of the East Fork at this point (Lewisville) we saw gravels comparable to those that we had examined at the point where we descended into the valley at Daybreak. They are overlain by younger terrace gravels and a few blocks of the lava falling down over them indicate that the lava is a flow overlying the gravels.

We turned around at Lewisville and climbed back up the south side of the valley and continued eastward over a ridge, which is a continuation (to the north) of the ridge upon which Battle Ground Lake is located, and which is probably ovunderlain everywhere by lavas like those we saw at Lewisville. East of this ridge we descended into a broad valley to Heisson. Here we parked our cars and taking our lunches went down to the fossil beds by the river. Treasher got a snack at the store and picked up a few tidbits from various members. The fossils are found in a bed of indurated tuff overlying a boulder agglomerate and overlain by basaltic lava flow. Some secondary mineralization was noted in the tuffs and the agglomerate and the jointing was almost vertically spaced. The joints were noted to have some effect upon erosion forms and to be the starting place in many cases of potholes of which there were many at this point. A method of faceting of boulders was noted here. Where potholes were eroded into the boulder agglomcrate the pebbles and boulders in the sides of the potholes were often faceted. Some of the pebbles, however, were much harder than the matrix and were not eroded so rapidly. In this case they protruded into the pothole. All facets formed in this manner showed concave faces. Pebbles and boulders faceted in this manner, it was observed, would have only one face except in rare instances where adjacent potholes approached one another when a pebble might have two faces. It was not considered likely that many of the faceted quartzite pebbles of the Troutdale and other formations noted by the members of the group in this region could have been faceted in this manner. The dip of the beds at Heisson is very flat but they probable slope slightly to the southeast as do the beds in most of the other outcrops in this region. If this dip continues westward to Daybreak and the sandstones observed there are a part of the same series then they lie some distance below the tuffs and agglomerates at Heisson.

As we returned to the cars we stopped to note the exposures of columnar basalt in the road cut. These are the lavas that overlie the fossil beds. Uncomformably on these lavas are some gravels that show considerable weathering and which may be glacial outwash.

We proceeded northward over a country of low hills and gentle slopes. Outcrops in the road cuts showed lavas and gravels. At a distance of about 4 miles we came to Farghar Lake. The lake which once existed there has been drained artificially and the old lake bed of extremely fertile soil is now used for growing bulbs and other crops of similar nature. The lake has been drained by a ditch not over 10 feet deep near the southwest corner through which the water drains into Rock Creek and thence into the East Fork below Heisson. The lake is irregular in shape and about as broad as it is long. The question of its origin was discussed. It has not the proper shape for a glacial lake; there are no recent lavas adjacent to it as far as could be determined and it is probably not formed by a lava dam; the topography is too subdued and does not suggest a landslide dam; in fact the lake appears to be closed in by early Tertiary lavas and interbedded sediments. It was explained to the group that to the northeast, in the direction of Amboy and Chelatchie Valley, other smaller depressions exist that have been drained naturally. These depressions lie in an almost straight line and are strongly suggestive of faulting. The fault, in order to produce these features, would be of the normal type with the north side dropped down.

Leaving Farghar Lake we followed along this line of depressions to Amboy, stopping en route to get a view of Tum Tum Mountain in the distance. At this stop it was noted that many steep north slopes were in evidence while practically all south slopes were gentle. The stop was made practically on the divide between the East Fork and the North Fork of the Lewis River. We then descended to Amboy where we crossed Cedar Creek and Chelatchie Creek and proceeded up Chelatchie Valley to Tum Tum Mountain at its head .

Chelatchie Valley is broad and flat and is drained by a small stream which does considerable meandering about the floor of the valley. It is bounded on the north by rather gentle slopes but on the south it is bounded by a long, straight, steep escarpment-like slope which is thought to be a fault scarp. This scarp lines up in a general way with Farghar Lake and the intervening depressions already mentioned. To the northeast beyond Tum Tum Mountain Canyon Creek follows a course in line with this scarp for a distance of about 2 miles as does one branch of Siouxon Creek still farther to the northeast. In Chelatchie Valley there are several step-toe buttes protruding from the valley fill. Along the escarpment there are numerous hanging valleys. Practically all the topographic features are strongly suggestive of faulting of the same type as that conjectured for the origin of Farghar Lake.

The party continued on to Tum Tum Mountain. A small part of the group climbed part way up the north side of the mountain with the idea of determining the nature of this conical topographic feature that is so prominent. From a distance it has every appearance of being a cinder cone but we were able to find no cinders upon or around it. The only rocks seen were all an indurated light colored tuff and the assumption is that the upper mountain is made up entirely of this type ofmaterial. Therefore the mountain is not of volcanic origin but is either an erosion remnant or was formed in some manner during the faulting that produced Chelatchie valley and was later modified by erosion. As we skirted the north side of Tum Tum Mountain on the way to the parking place and again as we started the ascent we noted hummocky topography at the foot of the mountain. This topography is characteristic of landsliding and as seen from above looks still more like landsliding. Also from above we could look down the canyon of Canyon Creek where it turns north at the foot of Tum Tum to flow into the North Fork of Lewis River. We decided that this stream had originally flowed down Chelatchie Valley but had been captured by a smaller stream working headward from the North Fork and perhaps aided by the landslides from Tum Tum.

Descending from the mountain we collected the rest of the party and returned down through Chelatchie Valley to Amboy where we turned to the right and followed down the valley of Cedar Creek for about 4 miles to a point where the road turns northward to climb up a side valley and thus out of the main valley. We noted that this valley was comparatively wide and the slopes gentle but as we followed down it the valley narrowed gradually and at the point where we left it the valley bottom was little more than wide enough to accommodate the stream. The exposures along the sides of the valley were all of basic lavas similar to those we had seen overlying the leaf beds at Heisson. These lavas all appeared to dip southerly or southeasterly. But as we ascended the side valley a deep road cut exposed for us a deposit of gravels quite different from anything that we had seen that day. These gravels, where we were able to uncover a fresh exposure, were light gray in color and were deeply weathered. The sizes ranged from sand to large boulders and some of the pebbles and boulders showed little rounding. These deposits were compared to those which were seen by the members of the society who visited Christmas Canyon two years ago. Many of the pebbles were of the felsitic rocks commonly found on the slopes of Mt.St.Helens and occurring abundantly in the terrace deposits along the North Fork of the Lewis River.

From this point we ascended the road to the top of the ridge and across it to the edge of the North Fork valley. As we turned west we passed close to Ariel Dam and could see the top through the trees. Then turning abruptly back to the east the road descended into the valley of Cedar Creek again which at this point is a narrow and deep canyon. On the ridge between Cedar Creek and the North Fork we observed terraces at three different elevations and wondered if they could be correlated with those which were seen by the Society on the trip up the East Fork last year. Where we recrossed Cedar Creek the stream is flowing over lava bedrock in a deep and narrow gorge in striking contrast to the wide valley which the stream occupies where we followed it down from the vicinity of Amboy. Also the gradient in the lower part of the stream is much steeper than in the upper part. The narrowing of the canyon and the increase in the gradient are both indications of a rejuvenation of this stream at a comparatively recent date. Whether this is due to tilting accompanying the faulting which formed Chelatchie Valley and Farghar Lake or to some other cause was not decided.

We then continued down the North Fork about three miles and turned southwest toward La Center. On the way one stop was made at a prominent outcrop of lava beside the road. The leader admitted that he made this stop just to see this outcrop for he hadn't the time to stop there on the scouting trip. The lava was of a platy type and showed a steep dip to the southeast and some indications of minor faulting but the hour was late and the light was too poor to see any more. As we were returning to the cars Mrs. MacKenzie received a rather severe fall. When we were all comfortably stowed in the cars again the party proceeded southwest to the Pacific Highway about a mile north of La Center and from there found their separate ways homeward.

THE GEOLOGY OF PART OF THE WALLOWA MOUNTAINS
by Clyde P. Ross
Oregon State Department of Geology
and Mineral Industries
In cooperation with the U.S.Geologic Survey
Bulletin 3, pp.74, pls.6 incl.
geologic map in pocket. figs.2
1938

AUTHOR'S ABSTRACT.

Stratigraphy: The rocks range in age from Paleozoic (Carboniferous or possibly older) to Recent. The Paleozoic rocks in the high mountains consist of a great series of lava flows and pyroclastics with sedimentary beds of probable shallow water origin overlying them. East of the high mountains is a large area of sedimentary rocks which may be in part older than the volcanics. Upper Triassic limestones with some shale and minor amounts of associated volcanic rocks rest unconformably on the Paleozoic strata. Above these are younger Mesozoic sedimentary rocks. These rocks, especially the older ones, are metamorphosed in varying degrees. They have been intruded by quartz diorite and granodiorite, albite granite, and by a diorite-gabbro complex. These different rocks, all of which may be related to each other, are clearly of Mesozoic age and probably mainly intruded during or just before the Cretaceous period. There is also an intrusion of some calcic rock now altered to amphibolite, which may be older. The Columbia River basalt overlies the Mesozoic and Paleozoic rocks and covers a large part of the region outside of the mountains proper. West of Sparta tuff, and in Eagle Valley beds of sand, gravel, and diatomaceous earth are intercalated in the lava. The alluvial filling of Pine and Eagle Valleys and the stream and glacial deposits are of even later date.

Structure: The dominant structural feature of the pre-Tertiary rocks is folding, which in the mountains has been so intense as to result in overturning. The average strike of the folds is about N. 26° E. in the mountains, swinging more to the east farther south. The strike of the larger faults is about N.30° W. The Tertiary rocks have been warped, but few definite folds have been produced. Faults in the Tertiary rocks almost surround Pine Valley, and small ones were noted in various other places.

Geologic History: None of the exposed rocks are known to be older than Carboniferous. During much of the Paleozoic era the region was probably part of a land mass. In the Carboniferous period it was submerged, but there were oscillations, some of which may have brought it temporarily above the sea. At this time there was a period of great volcanic activity. The Carboniferous ended with an epoch of strong folding. After an erosion interval marine Mesozoic deposits accompanied in places by lava and tuff were formed. This was followed near the end of the Mesozoic by folding, batholithic intrusion and uplift. The Wallowa Mountains and other present day ranges were born at this time. Later, after a sequence of erosional events not here discussed, successive flows of basaltic lava overlapped the flanks of the mountains and partially buried them. Some of these flows were erupted through fissures within the mountains, now occupied by dikes. The subsequent history has been one of erosion and glaciation, with comparatively minor earth movements.

Sec. 562, P. L. & R.

DR. ARTHUR C. JONES
2640 S. W. PATTON RD.,
PORTLAND, OREGON

GEOLOGICAL NEWS LETTER

Volume 4 Number 4
Feb. 25 1938

OFFICIAL BULLETIN
of the
GEOLOGICAL SOCIETY
of the
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Portland, Oregon

Bulletins issued semi-monthly on the loth and 25th
Yearly subscriptions. $2.00
All material for publication in the Bulletin should be sent to the Editor.
Address all other correspondence regarding the Bulletin and changes of address to the Business Manager.

LECTURES

Friday, March 11th: Mr. Arthur M. Swartley, Consulting Mining Engineer, State Department of Geology and Mineral Industries; "A Mining Engineer Looks at Geology".

ANNUAL BANQUET

Friday, February 25th: Annual Banquet and Business Meeting, Reed College Commons, 7:00 P.M. (Discussion of the program follows in another section of the News-Letter.)

DUES ! DUES ! DUES !

DUES are now Payable!!! Our fiscal year begins March 1st. Make checks payable to The Geological Society of the Oregon Country, and mail them to the Secretary, or give them to Leo Simon.

In planning our budget for the coming year, it is of course necessary to know what monies will be available and this can be done if the money is in the treasury. You intend to renew your dues any way, - why not do it right now so that the new officers will have a favorable situation under which to start business?

DO IT NOW !!

NEWS ABOUT OUR MEMBERS

J. C. Stevens, Director of the Geological Society, has been awarded national recognition in the form of the Norman gold medal, annual award of the American Society of Civil Engineers. His paper, "The Silt Problem", is discussed by Pacific Builder and Engineer, Feb. 5, 1938, in part as follows: "Written in 1934, the paper is a statistical study of all major reservoir dams in the world. Stressing the rapid rate at which reservoirs tend to fill with silt, the paper points out that silt has caused several reservoir dams in the Old World to become utterly useless."

Mr. Stevens also had a picture in the Oregon Journal, Saturday, Feb. 12th, 1938, showing him in Hamilton, Bermuda. The magazine SCIENCE for February 11, 1938, carries an announcement of the award and states, "adjudged the outstanding contribution of the year to engineering science".

Director Earl K. Nixon, of the State Department of Geology and Mineral Industries, addressed the Oregon Agate and Mineral Society on February 18th, about activities of the State Department.

ANNOUNCEMENT

ANNUAL MEETING AND BANQUET

Promptly at 7:00 P.M. on the evening of Friday, February 25th, 1938, we will meet at Reed College Commons for our annual meeting and banquet. It promises to be another memorable occasion. You who remember the attendance last year know that we had a "full house". The room at the Commons of Reed College is larger than the room we had last year, and it looks like it will be filled. There are a few places left, but we can sell no tickets after Tuesday, February 22, 1938. If you do not yet have your reservations get in touch with Leo Simon, 531 S.W.Washington Street, immediately.

Dress will be informal. Mr. Arthur M. Piper, of the United States Geological Survey, Groundwater Division, will be the toastmaster, and is busy getting his "wise cracks" ready. The toastmaster will use as a gavel the geological pick of Dr. Condon, which is furnished for this occasion by Mr. Ormond S. Bean, City Commissioner of Portland, and a member of this Society.

The Committee promises a few laughs with its program of stunts and music, and a full round of entertainment. If members desire to do so, they may bring geological specimens and "swap" them "sight unseen" for others. If you bring a specimen you are requested to wrap it. When you deliver it to the ushers you will get a number in return for it. During the course of the evening, you will be given an opportunity to receive your exchange specimen. Numbers will be given only to those who desire to participate in this by bringing a specimen.

Mr. Phil F. Brogan of Bend, Oregon, will deliver one of the most unusual addresses you have ever heard on the "Great News Stories of Ancient Oregon". Only a newspaper man would be able to do this, and his background of the scientific knowledge of geology indicates that we will hear something new from the standpoint of geology, a modern interpretation of the by-gone ages. He has lived many years in the region of which he will talk, and Central Oregon has always been a field of glamour for the geologist, whether he be an amateur or a professional.

To get to Reed College Commons, go to the entrance of the Reed College campus on East Woodstock Avenue at Reed College Place. The road on the campus leads directly to the Commons. Eastmoreland Trolley Coach stops at the entrance to the campus, for those who use the public transportation system.

ORIGIN OF THE WASHINGTON SCABLANDS.

by Edwin T. Hodge
Oregon State College.

Introduction:

In the northwestern part of the United States is a strange and unusual topography that is unduplicated in any other known part of the world. (Fig.1). It is characterized by great waterless canyons, waterfalls, and pot holes. These are associated with widespread perched erratics, thick gravel plains, upstream dipping torrential gravel beds and peculiar gravel terraces and bars. The above occur on a fantastically eroded basalt surface known as the Scablands. Lying on or between the Scablands are great deposits of loess-like soil.

All of the above occurs on so grand a scale that individual features are comparable in size to those described in any part of the world. The main area of Scabland alone occupies one-fourth of the State of Washington.

Many theories have been offered to explain this remarkable region, but of these only that of Bretz 1/ has been stated fully in many papers and therefore widely accepted. Bretz would explain all of these features of the Scablands by one all inclusive event: a single great flood or a series of great floods occurring within a short period of time and to which he has given the name Spokane Flood. His theory implies that the Scablands are the result of a single brief episode of the Pleistocene. In contrast with Bretz' theory I offer as an alternative hypothesis a theory wherein the history of the Scablands is considered an integral part of the late Tertiary history of British Columbia, Idaho, Washington, Oregon, and Nevada. The genesis of the Scablands is related to the origin and integration of the Columbia River. As such their true explanation is of fundamental importance in all problems related to the American Northwest from the Miocene to the present.

History of the Study:

The author became interested in this study in 1916 in British Columbia where the amazing interrelationships of the Frazer and Columbia rivers and their complex history were first manifested. Continuous investigation since then in the American Northwest shows the profound Pleistocene modifications of their drainage systems. In 1931 the American Association for the Advancement of Science provided the author with funds for the purpose of making a special investigation of the Scablands. As a result, the hypothesis below was formulated. The story was tested against additional evidence in 1932.

Suggested Explanation:

The outline of the story given below may be considered the first formal report of the investigation supported by the American Association for the Advancement of Science.

1/ Bretz, J.Harlan. The Grand Coulee; Amer.Geog.Soc.,Special Publication no. 15, 1932, chapter 4, pp. 39-83.

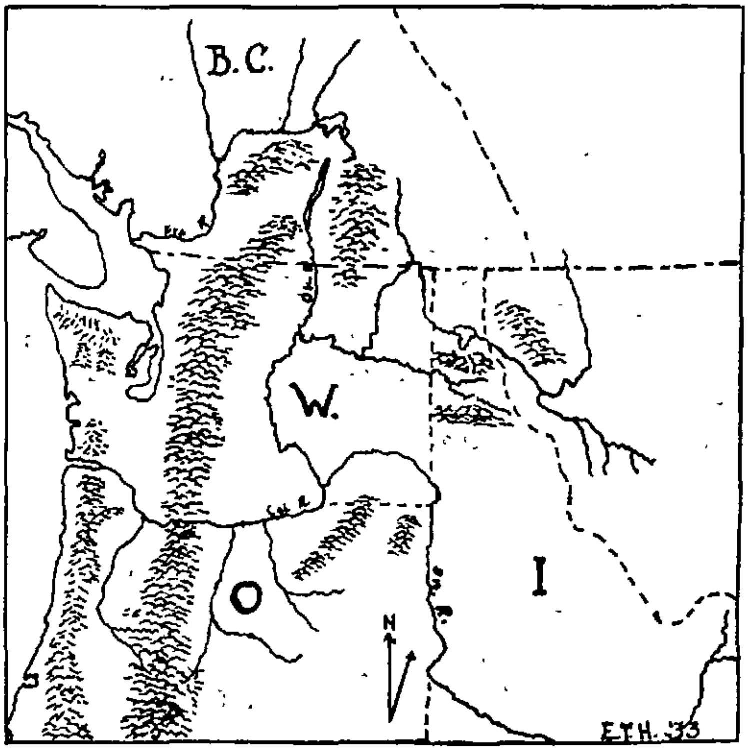


Figure 1. Location of Scablands and contiguous features.

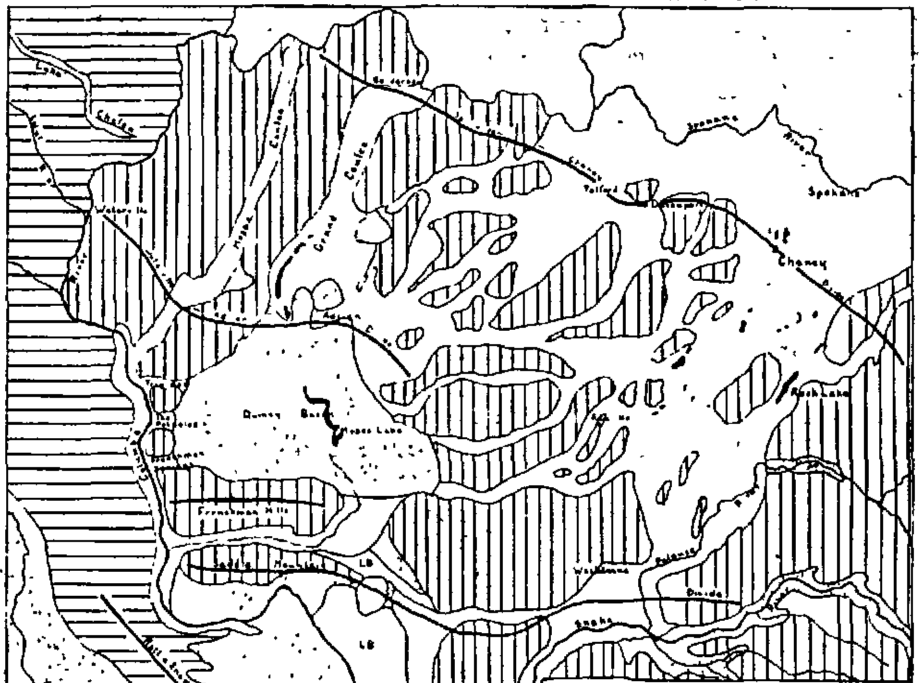


Figure 2. Place map of the Scablands.

The explanation offered considers the Scablands and related features to be the result of a long and complex series of events. The successive events were so numerous, and a complete description of each would demand so much space, that it is considered advisable at this time to give only an outline of their history.

Preliminary Stage:

1. The Columbia River basalt formation (Coriba) was laid down, folded and eroded generally to a stage of youth, but in places to that of maturity. (Fig.2). This surface (Coriba surface) was complicated by the issuance of the Spokane olivine basalts and still later by intracanyon lavas and by the deposition of intervening lake beds (Latah?). The Snake River if it flowed over this surface did not cross the Horse Heaven Hills. The Upper Columbia River, then, found an outlet by way of Okanogan Valley to the Fraser River and thence to the Pacific Ocean. The other streams on Coriba surface occupied structural basins between the Horse Heaven Hills, Saddle Mountain-Washtucna, Waterville-Adrian and the Sanderson-Cheney folds. Because Coriba surface extended westward without any important geographic change and because the Pliocene, Pleistocene and Recent volcanic piles which make up the Cascade Mountains did not exist, the above streams may have flowed directly to the west and debouched into the Pacific Ocean. These streams all flowed at a higher level than their present entrenched gradients.

2. The late Pliocene and early Pleistocene pyroclastics and lava flows erupted along the course and were the cause of the present Cascade Mountains in Washington and Oregon. They dammed the westward flowing rivers of southeastern Washington. The torrential beds derived from these volcanics formed a great piedmont fan deposit on the east side of the Cascade Mountains (Ellensburg formation). Lake beds (Ringold formation and others) which grade into the upper torrential beds were formed farther east in the lakes formed by the ponded rivers. The Upper Columbia River was not dammed.

First Ice Advance:

3. The Okanogan glacier advanced southward down the valley, dammed off the ancestral Upper Columbia River, which ponded north of the Sanderson-Cheney divide.

4. The ponded river spilled southward over the Sanderson-Cheney divide through the cols that had been cut by its south side tributaries. These cols were cut lower and lower, and valleys were eroded southward to the next, consequent streams flowing westward on Coriba surface. These valleys later directed the course of the Ice that later filled them.

5. During three glacial epochs glaciers moved towards the Scabland region from the west, north and east.

a. The western glaciers, south of Lake Chelan, may not have reached the present position of Columbia River, or at least had no important part in our theory.

b. The northern glaciers transgressed the Sanderson-Cheney divide at four places.

c. The eastern glaciers did not reach the Scablands.

6. The First Ice Advance, or Cheney Ice (Kansas?) had effects as follows:

a. The Okanogan ice lobe enlarged a spillway col and an old tributary valley (4 above) (Moses Coulee) in Coriba surface.

b. After the Okanogan ice had advanced up Upper Columbia River to the upper end of another valley (Grand Coulee), it diverted all Columbia for a long time through this spillway and cut it deeper than Moses Coulee. The ice then advanced down this spillway and deepened it.

c. Thin, wide sheets of ice advanced down Telford and the Cheney passages. Note that Grand Coulee lay between the two sources of ice.

d. The Okanogan ice finally became confluent with ice that descended the other northern valleys, and the Cheney ice may have extended as far south as Ephrata and Ritzville.

e. The ice eroded chiefly by plucking on a basalt surface. The basalt was broken into brick-bat pieces and fed to the glacier streams which transported the small pieces easily.

f. The ice plucked deeply, producing basins which were constantly enlarging at their upper ends. They were filled by ice beds which, remaining stagnant after the retreat of the ice lobes, prevented them from being filled by glacial debris.

g. The ice moved rapidly without much plucking over smooth inclined surfaces.

7. Within the closed basin, hereafter called the Scabland Basin, formed by the Cheney Ice front, the mountains of Idaho, the Horse Heaven Hills and the Cascade Mountains, the melting and retreating ice formed Lake Lewis. The lake beds deposited in Lake Lewis are found as far east as Fishtrap and as far north as Orondo and up to an elevation of 2300 feet. Some lake beds north of the Sanderson-Cheney divide may have been formed at this time. These lake beds along with those of 2 (above) served later to superpose all streams across the folds 1 (above).

8. In the meantime in Oregon and to the south of the Horse Heaven Hills the ancestral constituents of Columbia River also had been dammed by a piedmont fan (Dalles formation) on the east side of the Cascade Mountains. Condon Lake was the result and in it were laid down the Shutler beds. 2/

9. Condon Lake and Lake Lewis united, and their water spilled at 1900 feet in elevation over the Ortley divide and a consequent course across the Cascade Mountains.

2/ Hodge, E. T. Columbia River Fault: Bull.Geo.Soc.Amer., Vol.42, No. 1, pp. 189, 1931.

10. This produced the present superposed discharge way of Columbia River which as it entrenched its course, drained Condon Lake. Lake Lewis held behind the Horse Heaven Hills at a still higher elevation spilled over the Wallula col and cut Wallula Gateway into the Lower Columbia River which, with the added supply of water has continued its entrenchment since that time.

11. As Lake Lewis shrank in size the Snake River extended its course and eventually was led into the Columbia River. In like manner all other rivers of the Scabland Basin, having but one outlet were integrated and Columbia River came into existence.

12. Icebergs, calved from the Cheney Ice lobes in northern Washington, floated over the slowly lowering surfaces of Lake Lewis and Condon Lake and stranded and melted. Thus were dispersed the highest erratics. The Cheney Ice eroded vigorously only in northern Washington, British Columbia, and Idaho, hence the erratics that are "foreign" material. The erratics were carried down Columbia River into Oregon. The easily fractured basalt did not form erratics but was carried as stream gravels.

13. The lake beds of Lake Lewis were deposited with no determined unconformity on the older lake beds. Together the lake beds buried Coriba surface and obliterated all traces of the older drainage pattern. These beds lay below the original spillway of Lake Lewis and within the Scabland Basin, hence they were only subjected to erosion after Lake Lewis had been drained. Consequently the drainage from the stagnant Cheney Ice flowed over a large bed surface in courses quite independent of the structure of the pre-lake bed formation. The courses of the new stream were determined (x) by the sources of water, (y) by the Wallula Gateway and (z) by the steptoes of Pre-Cambrian, Jurassic and Coriba rocks. The result was (a) Snake River followed the north side of the Horse Heaven Hills to Wallula Gateway, (b) the streams flowing down the east side of the Cascade Mountains eventually followed the shortest course southward along the east side of the piedmont fan to Wallula Gateway, (c) upper Columbia River, blocked by the Okanogan glacier followed Cheney, Telford, Grand Coulee, and Moses Coulee outlets in southwestern courses over the lake beds to the united river of (b) above.

14. These streams entrenched into the lake beds, piedmont fan deposits and younger lavas and finally were superimposed upon the geometric and structural elevations of the original Coriba surface.

15. The lake beds were eroded dendrically. That is, the thin headward or northeastern areas of lake beds were easily stripped away from the outer or upper portion of the Scabland area and only small remnants were left, but in the lower western and southern area large flat patches of lake bed in the interstream areas were preserved.

16. The Cheney Ice became stagnant and in melting produced correlative effects as follows:

a. The melting water carried icebergs and dispersed erratics.

b. Stagnant ice filled deep holes and kept them from being filled by outwash debris.

c. Where the lake beds were thin and lying above buried ridges in the Coriba surface the streams were superposed, cut narrow and produced the Arlington type of channel.

d. The gravel formed chiefly from brick-bat basalt was spread by the discharge streams over the western and southern portions of the area, and filled the Quincy and Umatilla Basins.

e. The characteristic braided streams of melting glaciers flowed southwestward (see 13c above) over the lake beds. Ice occurred in the constricted channels cut in the lake beds or in the denuded basalt surface. These jams caused the channels to anastomose. The differential erosion in the anastomosing channels plus the plucking by stranded icebergs and by frizzle ice, produced the most characteristic feature of the Scablands previously described as moraine-like deposits near Arlington. 3/

f. The glacial streams were diverted by the ice-jam dams and cut new channels which in some cases were cut deeper than the dammed channel and formed a permanent diversion, and an abandoned perched channel. The reverse also took place.

g. Water falling over ice jams produced great pot holes and/or falls.

h. Dammed channels became flooded and in some places spilled over upstream divides and produced in their own tributaries up-valley dipping foreset beds and other types of perched deposits.

i. Ice jams produced moraine-like deposits from the gravels by crowding icebergs.

17. The stagnant Cheney Ice and its glacial water produced kames, eskers, pot holes, falls and perched gravel deposits.

18. The retreat of the Cheney Ice was complete in the Cheney and Telford passages, stagnant in Grand Coulee, and incomplete in Moses Coulee.

Second Ice Advance:

19. The ice retreated from upper Columbia Valley but remained in the Okanogan Valley. Hence the water spilled westward into ancestral Chelan-middle Columbia Valley (see 13b above) and continued to flow in this course until a canyon was cut below the level of the outlets through Sanderson-Cheney divide. This union of the Upper Columbia River, and those ancestral rivers previously joined, completed the integration of Columbia River. The deeper canyon cut by the well fed Columbia on the east side of the Cascade Mountains (see 13b above) gave an advantage to this spillway as compared to the choked, divided and slightly

3/. Hodge, E.T. Exceptional Morainlike Deposits in Oregon. Bull. of the Geol.Soc.of Amer., Vol. 42, pp. 985-1010, 1931.
In this peper the writer first announced his theory that the Scabland features were principally caused by iceberg jams.

entrenched spillways of 13c above. Hence it cut down so deep that the latter lost all of the water and became for the first, but not the last time, the dry water and glacial courses as we find them today.

20. The concentration of the glacial waters of northern Idaho, British Columbia and the eastern Cascade Mountain slopes, added to the combined waters of the Snake, Umatilla, John Day and Deschutes Rivers, caused the integrated Columbia Canyon to be rapidly entrenched below the level of the lake beds and into Coriba surface. In many places the river was superposed into large folds. The Pasco Basin was eroded.

21. The Second Ice, or Spokane Ice, advanced and again like the Cheney Ice formed a lobular front producing the following effects:

a. Okanogan lobe transgressed Columbia River, dammed it and diverted water through Moses and Grand Coulee.

b. The Spokane lobe revived the Telford and Cheney northeast-southwest channels (see 13c above).

c. Ice jams in the Moses Coulee, Grand Coulee, Telford and Cheney channels and in their dependent channels reproduced and enhanced the effects of the Cheney Ice advance. We do not know whether the first or the second glacial advance produced the greatest amount of Scabland, but we are of the opinion that the second advance of ice was the most effective.

d. Glacial-fluvial debris, at the time of the ice's furthest advance, filled the depressions south and west of the ice front. Stagnant ice prevented the proximal depressions from being filled with debris upon the ice's retreat.

e. The material eroded from lake beds and the fragmental basalt plucked from bed rock was carried by the swift water into the main streams. This debris was not piled up as moraines.

f. Columbia Canyon had now been in existence a long time and had, since its integration, carried most of the water. Hence the revived Scabland channels had to spill into it. The erosion of the basalt produced great volumes of pebbles. The gravels were deposited as deltas at the mouths of tributary streams. In the lower part of Columbia Canyon the gravels formed a thick flood plain. This plain was built up by seasonal floods and, since the flood waters from the Upper Columbia River always were in great excess of the small discharge of the tributaries in its lower course, the gravels were carried up the tributaries. These gravels therefore show torrential upstream bedding. The gravel flood plain has since been dissected into high terraces. Gravel bars were formed in the lee of defending rocks and below the end of a rock divide between two confluent streams.

g. More erratics were spread but at a lower elevation. These later erratics are much younger than those from the Cheney Ice.

22. The melting, stagnant ice yielded loess which was carried by wind and deposited upon all interstream areas. The loess blanketed much of the old surface including the older lake beds. In many places the loess was laid down in water and bedded.

The Third Ice Advance:

23. The Third Ice advance (Wisconsin?) did not advance as far as the other two ice fronts. It produced the following effects:

a. It scoured, scrubbed and cleaned the northern surface. The gravels so produced were added to those referred to in 21f above.

b. The melting peak of the Third Ice occurred after the gravels of the above paragraph had been discharged. This slightly loaded water was augmented by the water freed from Lake Missoula and other lakes when the ice retreated far up the northern valleys. All of this water was concentrated in Columbia Canyon and consequently the gravel flood plain (21f above) was cut into high terraces.

c. At a very early stage, when only a narrow channel had been cut in the gravel flood plain, icebergs formed in the channel. These and the frozen surface of the river during the winters caused ice-shoving which pushed the gravels of the flood plain up into levee-like walls on either side of the stream and formed fossae adjacent to each rock bound valley wall. Overflow around the ice filled channel and its gravel dikes, as well as water from tributary streams, deepened the fossae. Such fossae are notable in the lower canyon within the Scabland basin.

d. Icebergs, transported erratics, formed iceberg jams and further elaborated the anastomosing channels and Scabland features.

e. The glacial-fluvial waters flowing through the Moses Coulee, Grand Coulee, Telford and Cheney outlets, swept the upper channels clean, meandered over the gravel plains, and filled flush with the general surface the Quincy and Pasco Basins.

f. The same water cascading into Columbia Canyon cut waterfalls which, by reason of the long duration of this final glacio-fluvial stage, were large and retreated a long way up the tributary streams, especially at Trinidad, The Pot Holes and Frenchman Springs. Falls and pot holes were also formed where the water cascaded over iceberg dams or stagnant ice in the upper channels.

g. Fresh erratics were dispersed and dropped at lower levels than those of the two older stages.

h. The glacio-fluvial waters eroded the sides of the interstream loess hills. Some of the loess was redeposited in some of the abandoned stream courses.

i. Great quantities of gravels were carried westward and deposited in the Portland alluvial fan and for a time the Portland delta.

24. The ice made its final retreat up the valleys outside of the Scabland Basin. In its retreat it has left interesting and widespread effects of stagnant ice, glacial damming and stream diversion.

Conclusion:

The events are listed above as twenty-four in number only as a matter of convenience. There were many other important, intervening steps in this long sequence of events. The Scablands were not, according to this explanation, produced in a few months or years by one or a few catastrophic floods. They are the result of a long period of time dating from the Miocene to the Recent. The agencies were ice and glacial waters. The method was not that of glacial ice and glacio-fluviatile waters as generally described. On the contrary stagnant ice and iceberg jams, associated with water, were the important methods employed.

A basaltic surface in part protected by lake beds provided a special material to erode. The work was done in a region of hot summers and cold winters. The progress of the work was slow and involved many repeated attacks by the various agencies as the glacial ice advanced and retreated three different times over hundreds of thousands of years. Taken as a whole the methods employed were the common and usual methods that one may see at work today or reason to have been at work in many places in past time. The phenomenal features produced by these normal methods resulted from an unusual geomorphic and geologic terrane.

Sec. 562, P. L. & R.

Mrs. DORIS WOLCOTT JONES
2640 S W PATTON ROAD
PORTLAND, OREGON

GEOLOGICAL NEWS LETTER

Volume 4 Number 5
Mar. 10 1938

OFFICIAL BULLETIN
of the
GEOLOGICAL SOCIETY
of the
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

Officers - 1937

A. D. Vance - President

A. C. Jones - Vice Pres.
Lillian Neff - Sec.
Mabel Smith - Treas.
Tracy Wade - Director

E. T. Hodge - Director
C. D. Phillips - Director
K. N. Phillips - Director
J. C. Stevens - Director

Annual Meeting Committee

Eva [illegible]
Thomas Carney
R. P. Poppleton
David B. Weber
Kenneth Phillips
Nan Kurtichenoff
H. [illegible] Rockwell
Carl Richards

Grace Poppleton
Alma R. Carney
Irene Poppleton
Francis Weber
Florence Phillips
Mildred Phillips
[illegible]
[illegible]

Clarence D. Phillips, Chair

Ushers

Constance Endres
[illegible] Iverson

Florence Iverson
[illegible]

Officers - 1938

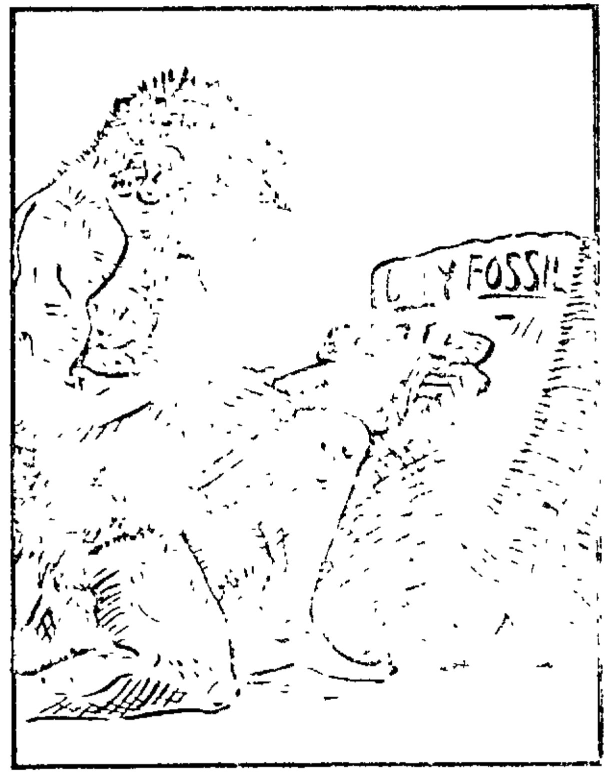
R. C. Treasher - President

J. P. Collins, Vice Pres.
Mrs. Amza [illegible] - Sec.
Mabel Smith - Treas.
J. C. Stevens - Director

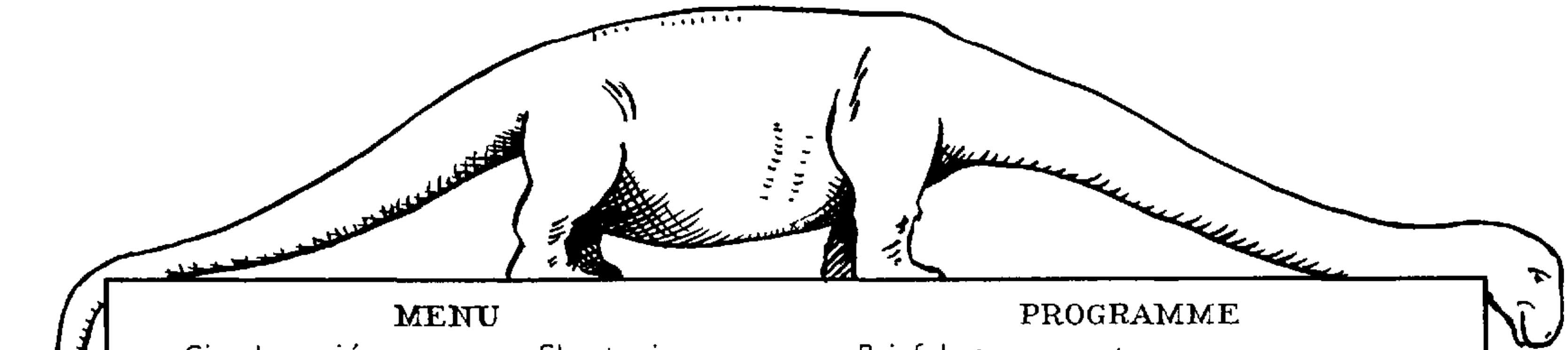
A. D. Vance - Director
C. D. Phillips - Director
K. N. Phillips - Director
C. [illegible] - Director

Sketches [illegible] Alvin [illegible]
Pullman, Washington

THIRD ANNUAL MEETING



February 25, 1938   *Reed College Commons*



MENU

Cinnabar a jú
(whole-tomato cocktail)

Sheet mica
(wafers)

Minor ore deposits in silica gel
(grapefruit-walnut-gelatin salad)

Metamorphoid Archæopteryx
(veal birds)

Volcanic mud flow
(mashed potatoes)

Pebble conglomerate
(whole-kernel corn)

Slabby hematite
(Harvard beets)

Saccharic protoplasm
(jelly)

Lapilli
(relish)

Oölite à la obicular en névé
(open-face cherry pie with whipped cream)

Ground water
(coffee)

Septarian nodules
(rolls)

INSTRUMENTAL MUSIC

Miss Myrna Higgins — *Piano*
Mr. Eric Cooper — *Violin*
Mr. Myron James — *Clarinet*

Mr. Homer Siegfried — *Song leader*
Mrs Alice Johnson Siegfried — *Accompanist*

PROGRAMME

Brief business meeting

"Mr. Toastmaster" — *Arthur M Piper*

"Welcome" — *Dr. Edwin T Hodge*

Introductions

"Reverberations from John Day country"
Phillips & Phillips

"Resume" — *A. D Vance*

Response — *Dr. Arthur C. Jones*

"Radioactivity of an amateur geologist"
Dr. Edwin T. Osgood

"Visible horizons" — *Ray C Treasher*

"Reminiscences" — *Bruce Schminky*

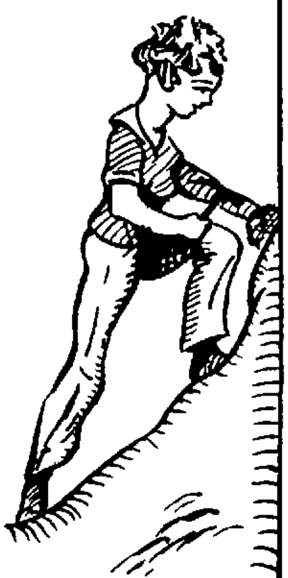
INTERMISSION

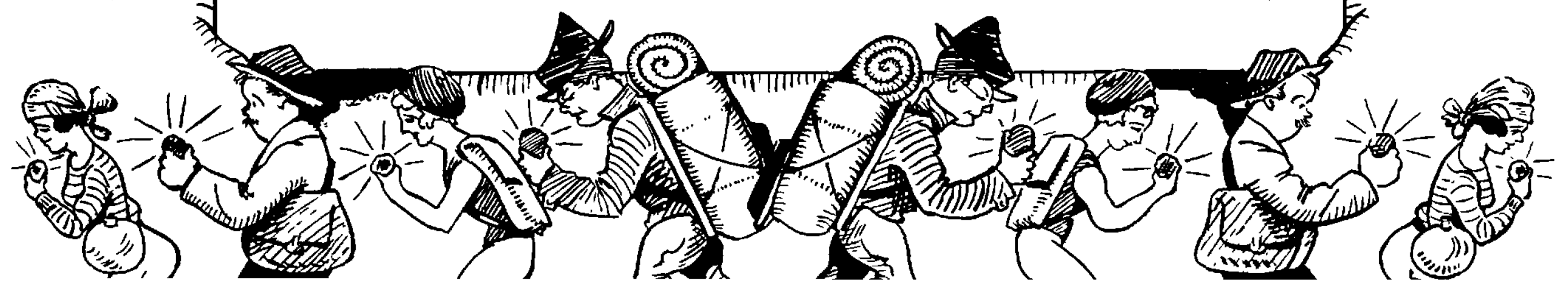
Vocal solo — *Homer Siegfried*
Accompanist — *Alice Johnson Siegfried*

Mesmeric Neolithic conversations
Norton & Piltdown

"Great news stories of ancient Oregon"
Phil F Brogan

"Finale Four" quartet
Phillips-Jones-Weber-Phillips





FIELD TRIPS

Sunday, March 13th:- Oregon City-New Era-Beaver Creek-Colton-Estacada-Fisher's Mill. A study of the Beaver Creek, Milk Creek, Clear Creek and Abernethy Creek valleys. Leave 6th & Yamhill at 8:00 A.M. Those desiring may join at the Falls View point at Oregon City. The Oregon City, Boring and Estacada quadrangle maps will cover the area to be visited.
Leader: H. B. Schminky.

Sunday, March 27th: Sandy-Bull Run area. Troutdale, Boring, Estacada and Mt. Hood and vicinity quadrangles will cover.
Leader: Mrs. Chester Wheeler.

Sunday, April 9th : University of Oregon, Eugene, Ore. Prof. Warren D. Smith, leader. Full details later. Registration will be required for this trip. Register early, and let us have a big turnout for our first visit to the University.

LECTURES

Friday, March 11th: Mr. Arthur M. Swartley, Consulting Mining Engineer, State Department of Geology and Mineral Industries, will be speaker, his subject being "A Mining Engineer Looks at Geology."

Friday, March 25th: Mr. Morris E. Opler, visiting lecturer on Anthropology, Reed College, will lecture on "Ancient Indian Cultures of Central America". Mr. Opler will be remembered for his very interesting and instructive talk on "Indian Culture of the Northwest" last fall.

NEW MEMBERS

Mr. and Mrs. Edw. A. Boyrie,
6326 S.E. Reed College Place,
Portland, Oregon.

Miss Emma Nordgren,
531 S.W. Washington St.,
Portland, Oregon.

Mr. and Mrs. John A. Ross,
1125 S.W. 12th Avenue,
Portland, Oregon.

LUNCHEON FLASHES

Luncheon every Thursday noon - Hilaires Basement.

March 3rd, 1938: Did you know that a dinosaur had a gizzard? Dr. Dake brought a jasper gastrolith from the gizzard of a dinosaur which was found in the oil country of Wyoming. He told us of dinosaurs.

Baldwin brought an unusual specimen of a fossil crab from Buxton area. Baldwin found the concretion - Vance cracked it.

Mr. Earl K. Nixon showed us some electrolytic manganese, produced by the Bureau of Mines of the United States under a new process. The samples were sent from San Francisco.

Luncheon Meeting, March 3rd, 1938:

Mr. Davis: "I move that the following resolution be adopted."

R E S O L U T I O N

"Resolved: that a vote of appreciation be extended to Mr. A. D. Vance for his administration of the office of chairman of our group for the past year".

Mr. Kenneth Noah Phillips: "I second the motion". Unanimously carried.

DUES ARE DUE !

The fiscal year of our Society begins March 1st, and dues are now payable. In order to budget expenditures for the coming year, our Executive Board should know what revenue will be available. Will you make a special effort to take care of this as soon as possible; if inconvenient to handle right now advise the Secretary that you intend to continue your membership and about when the dues will be paid. The dues are $3.50, payable to the Geological Society of the Oregon Country.

ADDRESSES.

Have you been receiving your News Letter? Is your address correct? The Secretary wishes to revise the membership list and will appreciate corrections of either name, address or telephone number.

The Business Manager cannot assure you receipt of the News Letter unless your address card is up-to-date. Please advise him of any change in address, AT ONCE, when a change is made. The expense of publication is such that we cannot guarantee to replace numbers missed when sent to an incorrect address. Mr. Baldwin's address is listed inside the cover.

GREETINGS !

Your new President sends greeting.

I wish to express my appreciation of the expression of your confidence by election to the high office of President. I shall try to meet the aims and traditions of our Society and to carry on the work which has been so ably directed by Mr. Vance, Mr. Phillips, and Dr. Hodge, their officers, executive boards, and committees.

There is a very gratifying response to all requests made of members to participate in this year's activities. YOU can help by offering your services for work to your liking.

Here's to us! With your help, this will be a most successful year. Your officers are already hard at work.

Ray C. Treasher
J. R. Collins
Mrs. Amza Barr
Mabel Smith

SECRETARY'S ANNUAL REPORT.

At the annual meeting of the Society held in the Reed College Commons on February 25th, 1938, the reading of the report of the Secretary for the past year was waived with instructions for publication of that report in the Bulletin. In accordance with those instructions, I hereby submit my report, which I trust meets with your approval.

For the period from March 1, 1937 to February 25, 1938, the Society had 123 members, one being an honorary member, 50 being charter members, 37 renewals other than charter members, 31 new members for the full year, and four short term members. This is a decrease of 20 members from the preceding period.

During the past year the Society had 21 meetings, sponsored 16 field trips of which seven were week-end trips, and published 24 bulletins.

The Executive Board held three meetings.

Six subscriptions to the Bulletin were obtained and one Bulletin sold.

During the past year the Society purchased on conditional sales contract Multigraph Machine for publishing its bulletins. The price was $345, down payment $69 and the balance to be paid in monthly payments of $23.00 each.

Total receipts for the year, including balance of $226.11 on hand at the beginning of the fiscal year, were $900.01 and disbursements of $639.54, leaving a balance of $260.47.

Lillian Neff,
Secretary.

TREASURER'S REPORT FOR YEAR ENDING FEBRUARY 28, 1938.

Cash on hand March 1, 1937			$226.11
Receipts:			
Memberships		$410.00	
Subscriptions to Bulletin	$12.00		
Bulletin sold	.15	12.15	
Credit Miscel. Post & Ptg			
Stamps Refunded	.10	.10	
Cr. Bulletin (Stencils sold)		2.55	
From 1937 Banquet Committee		14.10	
Receipts 1938 Banquet		235.00	
Total receipts for year			673.90
			$900.01
Disbursements:			
Initial payment multigraph		$69.00	
Programs 1937 banquet		25.00	
Stationery, letterheads and envelopes		16.50	
Floral & Acknowledgement account		16.25	
Brisbine & Mansfield, treasurer bond		5.00	
Library, Binding two vol. Bulletin		.70	
Miscellaneous trip expense		4.33	
Miscel. postage and printing		11.96	
Bulletin:			
Printing	$100.50		
Postage	51.15		
Stencils	29.85		
Paper	54.40		
Reprints	.50		
Addressing & Mailing	1.00		
Negatives & Drawings	5.25		
Total Cost Bulletin		242.65	
1938 Banquet:			
Reed College Commons	212.30		
Expense Guest Speaker	15.00		
Music	3.75		
Decorations	10.00		
Plates & Negatives (program)	5.50		
Kilham Staty. Co. (paper "	1.60		
Total		248.15	
Total Disbursements			639.54
Balance			$260.47

****

RECAPITULATION.

Equity in multigraph	$69.00	Membership Account	$410.00
Library	.70	Bulletin	12.15
Expense Acct. (items as above)	53.94	Surplus Mar. 1, 1937	226.11
Bulletin	240.10		
1937 Banquet deficit	10.90		
1938 Banquet deficit	13.15		
Cash on hand and in U.S. National Bank	260.47		
	$648.26		$648.26

Signed Mabel L. Smith
Treasurer

The third successful year of the Geological Society of the Oregon Country officially closed Friday evening, February 25th, with the annual dinner and meeting, held at Reed College Commons. Dinner was served shortly after seven o'clock to nearly two hundred members and friends. The program following, featured a talk by the guest speaker, Mr. Phil Brogan, of Bend, introduction of the incoming president, Ray C. Treasher, skits and songs by members, the appearance of Norman Norton, ventriloquist, and pictures shown by Bruce Schminky.

Mr. Arthur M. Piper, of the United States Geological Survey, Ground Water Division, was toastmaster.

The songs, interspersed among the talks, were led by a quartet consisting of Clarence Phillips, Kenneth Phillips, Dr. D. E. Weber, and Dr. Arthur Jones. The song sheet used was originated by members of the Society, the words set to old familiar tunes. Authors of the songs included Mr. and Mrs. Kenneth Phillips, Dr. Arthur Jones, Dr. and Mrs. Weber, Miss Eva Catlin, Mrs. Irene Poppleton, and Miss Emma Nordgren. These cleverly written songs referred to activities of the Society, and might well be preserved by the members for use at informal campfire gatherings.

The toastmaster, Mr. Piper, first called upon Dr. Edwin T. Hodge, the "father" of the Society, who responded in part, as follows:

"It gives me great pleasure to welcome you here this evening. I am more pleased, because, during the last year or two, I was never quite sure in my own mind whether I would have the pleasure of greeting you here. The past years of life for this Society was like the life of an infant. Because it was alleged that I had something to do with its parentage, I thought I had some responsibility. I called in eminent doctors. In spite of their diagnosis, the infant child lived into the second year. It proved, not only that it could live, but that it could talk, and even walk. Now, here we are, in the third year of the Society's life, and it has reached that point where it can do some things for itself. For instance, to help dress itself, take care of itself. So, I am more than delighted, at this third annual meeting, to see our Society gathered.

"I am very proud of my connection with its origin, because of the quality it embodies, people who are interested in geology. You are interested in geology, because there is something different about you. You have an interest in the world you live in. You want to know why things are what they are, and that, of course, indicates the intelligent side of our character.

"Here we have a Society, one of the few societies in the state of Oregon, that is founded upon intelligent interest, and that is the reason why I am so proud to be a part of you. I see an organization that will probably do more for the state of Oregon than any other organization can possibly do. We are an organization that will find out things that will appeal to the world. We are going to find them out, and with them will dominate a part of the daily life.

"So I welcome you here this third time. I welcome you as a matter of deep pride and satisfaction in what you are, and what you are going to be as the years pass on."

The retiring president, A. D. Vance, gave a resume of the meetings and activities of the Society during the past year. Naming the speakers and subjects, he said that every speaker was a leader in the field from which the subject was chosen. Reviewing the field trips, he stated that every trip was accompanied by rain or fog

Mr. Vance called attention to the luncheon meetings held each Thursday in the basement banquet room at Hilaire's restaurant. These are important because something of geological interest is always discussed.

Dr. Arthur Jones, retiring vice-president, speaking briefly, presented Mr. Vance with two publications on Paleontology, his favorite hobby. These publications are:

Methods in Paleontology, by Charles L. Camp and G. Dallas Hanna.
The Fossil Stalk-eyed Crustacea of the Pacific Slope of North America, by Mary J. Rathbun, U.S.National Museum, Smithsonian Institution. Bulletin 113.

Ray C. Treasher, the incoming President, was enthusiastically applauded on being presented. In outlining his policy for the new year, Mr. Treasher read the objects of the Society as set forth in the constitution. In this connection, he said:

"Our main objective should be that the members are provided with the type of activity which they desire. It is natural to have somewhat different interests. First of all, we have those people interested in geology. Also, in the great outdoors, those interested in nature, who want to learn something about nature. In a third group are those, who, through inspiration given them and us by Dr. Hodge, wish to carry on some type of research work. Its committee already has a project under way, and they are doing remarkable work. It will be our endeavor to try to provide service to those three groups, which as nearly as I can see it, more or less covers the field."

Mr. Treasher mentioned that the United States Geological Survey is including reference to articles printed in the Society's news letter, which is equivalent to national recognition. He asked for contributions to the news letter, urged interest in the enlistment of others in the society, and the effort to stimulate interest by the people in this community and in the state. He said the question was often asked, "What will I get out of the Society?" His reply: "I think there is only one answer to that. You will get out of it exactly what you put in. With the great number of you, there is no question we will have a society of members striving to do something to further geologic knowledge in the Oregon country."

The talk given by Mr. Phil Brogan, of Bend, speaker of the evening, appears in another section of this Bulletin. His subject, "Great News Stories of Ancient Oregon". The hour was late when his turn came in the long program, so he felt obliged to shorten his speech. At its conclusion he was presented with a block of polished black marble, about four inches square.

Commissioner Ormond R. Bean, a grandson of Dr. Condon, was introduced during the evening. Referring to Dr. Condon's geological hammer, being used as a gavel, he said he can remember seeing Dr. Condon use it at Newport. While it is different from the ones used now, he thinks it was just as effective.

Dr. Francis T. Jones, of Pacific University, Forest Grove, acknowledging introduction, stated that he found a geology "pick" without a handle, at the university, which he thinks must have belonged to Dr. Condon. Oregon's noted geologist, at one time, taught geology at Pacific university, and it was during this period that he decided to follow up special geology, said Dr. Jones. Looking through the records, Dr. Jones was unable to find the name of any other person who was a teacher of geology at Pacific University.

Dr. Earl L. Packard, dean of science at Oregon State College, expressed his interest in the organization, and said: "I, too, am exceedingly proud of its existence, and to have watched its development." He spoke in very complimentary terms of the geological and paleontological knowledge of the principal speaker, Mr. Brogan.

Dr. Warren D. Smith, of the University of Oregon, invited the members of this organization to visit the new Natural History Museum recently opened at the University, to see some of the things collected by Dr. Condon. A field trip is also planned in connection with the proposed visit.

Dr. Ethel Sanborn, distinguished Paleobotanist at Oregon State College, was introduced, also Professor Watson, of Pacific University, Forest Grove, H.E. Rockwell, president of the Oregon Agate and Mineral society, and George H. Canfield, of the United States Geological Survey, water resources branch. Mr. Canfield told of using a gavel at an engineering organization meeting last year, which was made from a cedar log found at a depth of 400 feet beneath the surface, at Tacoma. The log was estimated to be about 15,000 years old.

A strictly amusement feature of the program recalled an incident which occurred at Mitchell last year, when a Society Caravan camped there overnight. Clarence Phillips played the sheriff, and Kenneth Phillips was the auto camp owner. The story evolved around some sheets inadvertently carried away from one of the cabins.

An improvised radio broadcast by Dr. Edwin E. Osgood caused much hilarity. One item was a take-off on Los Angeles' much advertised landslide, which he pronounced as being only half as big as a recent slide on West Burnside street in Portland. He gave news "flashes", Walter Winchell style, about members of the Society, and, cleverly imitating radio's Fibber McGee, told about Idaho's falling farm, which brought fame and fortune to the farmer.

Appropriate to the occasion also, and much enjoyed, was the ventriloquism of Norman Norton. His dummy, calling himself Ray Treasher Jr., conversed with a number of persons in his audience. Finally he talked with someone "down below", climaxed with the appearance of a skeleton of a pre-historic man.

Mr. Bruce Schminky showed two films of caravan field trips. The first pictured the trip to Bend and vicinity, and the second was taken on the boat trip to Bonneville last summer.

A short business meeting was held immediately following the dinner. It was voted to dispense with the reading of the annual reports of the secretary and treasurer, and have them printed in the official bulletin. Resolutions were passed, expressing appreciation for the use of the Public Service Company's auditorium, for the co-operation of the press of Portland and vicinity in the publication of news of the Society, and for service rendered by Reed College Commons in connection with the annual dinner.

Clarence Phillips, chairman of the annual meeting committee, thanked Mr. Bean for the use of Dr. Condon's geology hammer, as a gavel. This gavel has been used at each annual meeting of the Society. Mr. Phillips called attention to the art work on the programs, done by a non-member, Mr. Alvin Bond, and to the lettering, by Mr. Arthur Piper. He also thanked all those who contributed to the program, decorations, etc.

The tables for the dinner were decorated with spring flowers, a large centerpiece being arranged on the speakers' table. The serving was done by Reed College students. A program of music was enjoyed throughout the dinner, furnished by a trio consisting of Mrs. Myrna Higgins, Mr. Eric Cooper, and Mr. Myron James. The menu, as in previous years, was written in terms of geology.

On the mantel over the large fireplace were arranged a number of clay models of dinosaurs, made by Dr. and Mrs. W. Claude Adams. Mr. Thomas Carney also displayed a small dinosaur model in plaster, the first of a series he is planning. Interesting enlarged photographs of the Bend trip were placed along the wall above a table of choice fossil specimens.

The events of the evening were concluded with a song by the quartet, to the tune of "The Old Gray Mare".

The Histogenesis, Classification and Identification of the Cells of the Blood and Marrow Based on Cultures and Hematologic Studies of Human Marrow and Blood, American Journal of Clinical Pathology 8:59-74 (Jan.) 1938, by Edwin E. Osgood, M.D., Assistant Professor of Medicine, University of Oregon Medical School, Portland, Oregon.

Much confusion exists in the literature on the blood and bone marrow because the author believes, of the cell terminology. A new nomenclature is suggested in which some old names have been retained and new names which are descriptive of the cells and are clearly defined have been coined. A table of nomenclature in which the recommended names and all of the old names for each cell is given, which should further clarify the terminology.

A discussion of the development of the blood cells gives the most important theories concerning the origin of the cells of the blood and the author's views. The characteristics of each cell type are clearly defined.

A system of cell identification has been devised by means of a series of tables whereby a cell which has never been seen nor heard of before can be classified and named. This is the first time such a system has been made available. Use of the tables is based on the answering of simple questions, such as the presence or absence of granules, the size of the cell, etc.

Review of the Atlas of Hematology, American Journal of Clinical Pathology 8:97 (Jan.) 1938.

Atlas of Hematology. By Edwin E. Osgood, A.M., M.D., Assistant Professor of Medicine and Head of Experimental Medicine, University of Oregon Medical School, and Clarice Ashworth, Medical Illustrator, University of Oregon Medical School. Cloth 255 pp., 325 colored plates, $10.00. J.W.Stacey, Inc., San Francisco.

Dr. Osgood's reputation as a hematologist, teacher, and investigator in the field of hematology suffices to ensure for this book a place among the outstanding texts on hematology.

The chapters describing the blood cells (I-X) are followed by seven chapters in which the hematological aspects of disease in general and diseases of the blood in particular are excellently and clearly discussed. This section should prove of great interest to the physician and clinical pathologist.

The author, the illustrator, and the publisher alike deserve the highest commendation for the excellence of the plates and the exceptional manner in which they have been reproduced. This reviewer has seldom seen colored reproductions of stained blood cells which so closely approximate the actual picture seen under the microscope.

It may be predicted with confidence that this atlas for many years will serve a useful purpose, not only as a medium for the instruction of the student and the student technician, but as a reference text for the physician, clinical pathologist, and hematologist.

No matter how extensive one's hematologic book shelf may be, this volume can be added to it with profit.

(Highlights of the address, "Great News Stories of Ancient Oregon", delivered by Phil F. Brogan, member of The Bend Bulletin editorial staff, at the annual meeting of the Geological Society of the Oregon Country on the Reed College campus, follows in abbreviated form).

Faced by such a distinguished audience and aware that four of my former college instructors are present, I propose to remain within my profession, that of a newspaper writer, in speaking to you tonight. Yet, I shall make inroads into the field of geology. My subject, which your considerate program chairman permitted me to select, will be "Great News Stories of Ancient Oregon". I hope to touch on mighty, cataclysmic events of old Oregon which would have been page 1, top head news stories if some eternal being, a reporter of the ages had been present to record them.

What are the great news stories of ancient Oregon? They are stories of ancient seas that pounded shores now elevated into mountain tops. They are stories of mountain ranges in the agony of birth. They are stories of a forest that migrated from another continent and stories of the coming of mammals from the east, crossing a newly established land connection to the new Oregon country.

I shall deal with these stories not in the order of their importance or their significance in shaping the present Oregon country, but in chronological order. Many of you may not agree with my selection of Oregon's great geological stories. Because of limited time it will be necessary to leave out many events that played major roles in forming the present scenic land of Oregon.

The first of Oregon's great news stories of the ages occurred in that distant Mesozoic day when a craggy island appeared above the western waves and was swept by salty spray. The appearance of that island, Professor Thomas Condon's Shoshone land of the present Blue Mountains, marked the birth of the Oregon country. I realize that this story, and others that I shall recount, are not ones that could have been reported in one day - in time to catch a morning or afternoon edition. Many of the news stories of primeval Oregon were eons in materializing.

Another significant, but not spectacular news story occurred late in Cretaceous times when the Chico sea, last to sweep over interior Oregon, started to recede, carrying with it the rich life of the late Mesozoic. Another news story that would have made a great feature article for a Sunday supplement of the early Cenozoic was an age-long account of the redwood forest that migrated across the Bering land connection from Asia, moved down the western coast of America, left its record in the stones of eastern Oregon, then made a final stand in southern Oregon and northern California.

One of the most spectacular of all Oregon's great news stories occurred about the middle of the Oligocene, when the Cascades made their initial growth, tossing vast piles of volcanic debris into marine water to the west, filling up old lake depressions to the east. Later, in the late Pliocene or early Pleistocene, the majestic Cascades of the present time came into existence, and again there occurred terrific volcanism that would have provided many great news stories for our reporter of the ages.

Members of the society who have searched through the Clarno and Bridge Creek clays for fossils realize that mammals were missing from the Oregon country in the early Cenozoic. Then, one day or one eon, a land connection was established to the east.

The Histogenesis, Classification and Identification of the Cells of the Blood and Marrow Based on Cultures and Hematologic Studies of Human Marrow and Blood, American Journal of Clinical Pathology 8:59-74 (Jan.) 1938, by Edwin E. Osgood, M.D., Assistant Professor of Medicine, University of Oregon Medical School, Portland, Oregon.

Much confusion exists in the literature on the blood and bone marrow because the author believes, of the cell terminology. A new nomenclature is suggested in which some old names have been retained and new names which are descriptive of the cells and are clearly defined have been coined. A table of nomenclature in which the recommended names and all of the old names for each cell is given, which should further clarify the terminology.

A discussion of the development of the blood cells gives the most important theories concerning the origin of the cells of the blood and the author's views. The characteristics of each cell type are clearly defined.

A system of cell identification has been devised by means of a series of tables whereby a cell which has never been seen nor heard of before can be classified and named. This is the first time such a system has been made available. Use of the tables is based on the answering of simple questions, such as the presence or absence of granules, the size of the cell, etc.

Review of the Atlas of Hematology, American Journal of Clinical Pathology 8:97 (Jan.) 1938.

Atlas of Hematology. By Edwin E. Osgood, A.M., M.D., Assistant Professor of Medicine and Head of Experimental Medicine, University of Oregon Medical School, and Clarice Ashworth, Medical Illustrator, University of Oregon Medical School. Cloth 255 pp., 325 colored plates, $10.00. J.W.Stacey, Inc., San Francisco.

Dr. Osgood's reputation as a hematologist, teacher, and investigator in the field of hematology suffices to ensure for this book a place among the outstanding texts on hematology.

The chapters describing the blood cells (I-X) are followed by seven chapters in which the hematological aspects of disease in general and diseases of the blood in particular are excellently and clearly discussed. This section should prove of great interest to the physician and clinical pathologist.

The author, the illustrator, and the publisher alike deserve the highest commendation for the excellence of the plates and the exceptional manner in which they have been reproduced. This reviewer has seldom seen colored reproductions of stained blood cells which so closely approximate the actual picture seen under the microscope.

It may be predicted with confidence that this atlas for many years will serve a useful purpose, not only as a medium for the instruction of the student and the student technician, but as a reference text for the physician, clinical pathologist, and hematologist.

No matter how extensive one's hematologic book shelf may be, this volume can be added to it with profit.

(Highlights of the address, "Great News Stories of Ancient Oregon", delivered by Phil F. Brogan, member of The Bend Bulletin editorial staff, at the annual meeting of the Geological Society of the Oregon Country on the Reed College campus, follows in abbreviated form).

Faced by such a distinguished audience and aware that four of my former college instructors are present, I propose to remain within my profession, that of a newspaper writer, in speaking to you tonight. Yet, I shall make inroads into the field of geology. My subject, which your considerate program chairman permitted me to select, will be "Great News Stories of Ancient Oregon". I hope to touch on mighty, cataclysmic events of old Oregon which would have been page 1, top head news stories if some eternal being, a reporter of the ages, had been present to record them.

What are the great news stories of ancient Oregon? They are stories of ancient seas that pounded shores now elevated into mountain tops. They are stories of mountain ranges in the agony of birth. They are stories of a forest that migrated from another continent and stories of the coming of mammals from the east, crossing a newly established land connection to the new Oregon country.

I shall deal with these stories not in the order of their importance or their significance in shaping the present Oregon country, but in chronological order. Many of you may not agree with my selection of Oregon's great geological stories. Because of limited time it will be necessary to leave out many events that played major roles in forming the present scenic land of Oregon.

The first of Oregon's great news stories of the ages occurred in that distant Mesozoic day when a craggy island appeared above the western waves and was swept by salty spray. The appearance of that island, Professor Thomas Condon's Shoshone land of the present Blue Mountains, marked the birth of the Oregon country. I realize that this story, and others that I shall recount, are not ones that could have been reported in one day - in time to catch a morning or afternoon edition. Many of the news stories of primeval Oregon were eons in materializing.

Another significant, but not spectacular news story occurred late in Cretaceous times when the Chico sea, last to sweep over interior Oregon, started to recede, carrying with it the rich life of the late Mesozoic. Another news story that would have made a great feature article for a Sunday supplement of the early Cenozoic was an age-long account of the redwood forest that migrated across the Bering land connection from Asia, moved down the western coast of America, left its record in the stones of eastern Oregon, then made a final stand in southern Oregon and northern California.

One of the most spectacular of all Oregon's great news stories occurred about the middle of the Oligocene, when the Cascades made their initial growth, tossing vast piles of volcanic debris into marine water to the west, filling up old lake depressions to the east. Later, in the late Pliocene or early Pleistocene, the majestic Cascades of the present time came into existence, and again there occurred terrific volcanism that would have provided many great news stories for our reporter of the ages.

Members of the society who have searched through the Clarno and Bridge Creek clays for fossils realize that mammals were missing from the Oregon country in the early Cenozoic. Then, one day or one eon, a land connection was established to the east.

Mammals trekked in from the old Rocky Mountain country. That was a great news story - the coming of the first mammals to the new Oregon country.

In the Miocene occurred a cataclysmic news story, the flooding of the entire northwest with the Columbia lavas. If our reporter of the ages had been on the job back in those days, who probably would have written a news story that he considered final - a graphic account of the destruction of the Oregon country by a flood of molten rock. Yet, that was not the end of the Oregon of old. The lava cooled, disintegrated and formed new soil. Life returned and mammals, slightly changed in form, again took their place on the Oregon horizon in Mascall times.

A reporter of the eons would have had a great news yarn to type off in that remote age when the Cascade superstructure was formed and volcanic debris blocked the ancestral channel of the mighty Columbia. That story of the Pleistocene would have been an account of the formation of a vast lake east of the new Cascade barrier, in The Dalles country of the present. And another significant news story could have been written that day when Lake Condon found its way over a new course and the Columbia started the mighty task of cutting its present gorge.

It is necessary for me hurriedly to pass up many great news stories of ancient Oregon. In old Lake county could have been obtained startling news stories, in that age when the great faults occurred and Abert rim thrust its rocky crest some 2000 feet into the Central Oregon skies. More great news stories occurred in the not so distant past when lavas tumbled into the Crooked River gorge near old Trail crossing, choking the ancestral canyon and forming the present spectacular box canyons of interior Oregon. Central Oregon's strange landslide topography holds many unwritten news stories. The mighty glaciers of the ancient Cascades carved their news stories in deep canyons.

Oregon's greatest news story could have been written that day when the snowy peak of majestic Mount Mazama of the southern Cascades suddenly disappeared and Crater lake came into existence.

Oregon's final great geologic story may not yet be written, but we are confident that if volcanic activity again occurs in the Oregon land it will be of the quiet type. A few wisps of volcanic smoke around the snowy peaks of the Three Sisters, Jefferson or Hood would be welcomed by people of Oregon, for such volcanic activity would attract unnumbered tourists to the state.

California has a quiet little volcano, Mount Lassen, and it is a national monument.

Sec. 562, P. L. & R.

Mrs. DORIS WOLCOTT JONES
2640 S W PATTON ROAD
PORTLAND, OREGON

GEOLOGICAL NEWS LETTER

Volume 4 Number 6
Mar. 25 1938

OFFICIAL BULLETIN
of the
GEOLOGICAL SOCIETY
of the
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * * *

Lectures

Second and Fourth Fridays, 8:00 P.M., Public Service Auditorium, 3rd floor

Friday March 25th	:	Lecture to be arranged.
Friday April 8th	:	Mr. Morris Opler, visiting lecturer on Anthropology, Reed College, will lecture on "Ancient Indian Cultures of Central America". Mr. Opler will be remembered for his very interesting and instructive talk on "Indian Culture of the Northwest", last fall.

Field Trips

Sundays following the second and fourth Fridays: Meet at 6th and Yamhill.

Sunday March 27th	:	Sandy-Bull Run area. Troutdale, Boring, Estacada, and Mt. Hood and vicinity quadrangles will cover. Leader: Mrs. Chet Wheeler. This general area is proving of great interest in developing our knowledge of the general Portland region. Don't miss any of these trips.

** SPECIAL FEATURE

Sat. & Sunday April 9th & 10th	:	Eugene Week-End. Banquet Saturday evening at Eugene, arranged by Dr. W. D. Smith and the Condon Club; to be followed by an inspection of the newly opened museum. Sunday, there will be a field trip, led by Dr. Smith. Extensive preparations are being made for this trip and it should be one of the most interesting of the year.

New Members

Miss Elma Abrahamson,
1524 N.E. Ainsworth St.,
Portland, Oregon.

Mr. J. Martin Weber,
1520 S.W. Montgomery St.,
Portland, Oregon.

Committees

The following committees and chairmen have been authorized by the Executive Board. Names of committee members will be published as soon as data is received from committee chairmen.

Membership Promotion: Leo Simon, Chairman

Trip: Chet Wheeler, Chairman
A. W. Hancock
Russell Collins
Florence Iverson
Helen Iverson
Constance Enders
Emma Nordgren
C. J. Borum
A. D. Vance

News-Letter: Raymond Baldwin, Chairman
K. N. Phillips
A. D. Vance
Bruce Schminky
Eva Catlin
Ray Treasher

Public Relations: Clarence Phillips, Chairman

Librarian and Curator of Maps: Raymond Baldwin, Chairman

Research: Arthur M. Piper, Chairman
A. D. Vance — Raymond Baldwin
C. D. Phillips — A. W. Hancock
K. N. Phillips — Bruce Schminky
Russ Collins

Historian: Mrs. Chet Wheeler

Exhibits: Mr. Tom Carney

Social: Florence Iverson — Constance Enders
Helen Iverson — Emma Nordgren

Auditing: L. E. Kurtichanof, Chairman

Publicity: Bruce Schminky, Chairman

Summer Camp: Bruce Schminky, Chairman

Service: Trace Wade, Chairman

Relations with Other Groups:

Carl Richards, Chairman	(Mazamas)
K. N. Phillips	(U.S.GS.)
E. H. Rockwell	(Agate & Mineral Soc.)
W. A. Reeves	(State Highway)
Earl K. Nixon	(Dept.Geol.& Min.Ind.)
Barney MacNab	(Chamber of Commerce)

Other committees may be appointed from time to time as the need arises. Members who would like to serve on committees are asked to get in touch with the president. It is difficult for chairmen to pick committee members unless they know them personally, and many good workers are omitted. Will you cooperate?

Executive Board

The Executive Board has appointed two Directors to serve expired terms and resignations of former directors. Mr. Claire Holdredge resigned after his appointment to Colombia, South America, by the Shell Oil Company. The appointed term of Mr. J. C. Stevens expired, and an appointment was made. The new Directors are:

Dr. Edwin T. Hodge
Raymond Baldwin

News of the Members

Dr. Francis G. Jones spoke to the Oregon Agate and Mineral Society at their regular meeting on March 18th on the subject, "The Use of Polarized Light." The recently introduced artificial substance "polaroid" was used to demonstrate the manner in which this material is of value to science.

Leo F. Simon gave an illustrated lecture on "Birds of Sauvies Island" at a meeting of the Oregon Audubon Society held in the Y.M.C.A. auditorium on March 8th.

Earl K. Nixon, Director, Department of Geology & Mineral Industries, addressed the Grants Pass Chamber of Commerce on Monday, March 14th, discussing the work of the Department and its place in Oregon.

Ray C. Treasher, Geologist for the State Department, presented a paper at the request of the American Ceramic Society, at their annual meeting of the section, in Seattle on March 5th. The subject was: "Refractory Clays in Western Oregon."

Dr. H. C. Dake has had a manuscript of his, entitled: "Gem Minerals of Oregon", published by the State Department of G. & M.I. A review of this publication appears in another part of the News-Letter.

* * * * * * * * * * * * * * LUNCHEON FLASHES * * * * * * * * * * * * * * * *

Around the luncheon table, - March 10th.

Tracy Wade brought down his Volume I of Zittle on invertebrate fossils to give weight to some of his opinions of the previous week. Mr. Wade called attention to the fact that Zittle is not mentioned in the Bibliography of Oregon Geology, and it should be.

Dr. Weber displayed a ?gastrolith? found in the Clackamas Valley. No wonder these prehistoric beasts weighed so much if they carried around all these rocks. Perhaps we should class them as the earliest geologists, or rock collectors.

Dr. Adams brought for examination some walrus teeth which were found in 1898 in the gold fields of Alaska.

Franklin Davis demonstrated a new, strong, pocket-size permalloy magnet, without case. This baby-sized affair has a surprising amount of magnetic force.

Around the luncheon table, - March 17th.

Announcement was made of Bull. no. 7, "Gem Minerals of Oregon", a new release by the State Dept. of G. & M.I.

Your reporter was tardy. However, he promises bigger and better news stories in the future. Dr. Hodge was with us again, and it seemed like old times to have him with us at the luncheon table.

Luncheon every Thursday noon, in the basement at Hilaires. This group is "unofficial", there is no organization, but an enjoyable hour is spent in geological fellowship. Members of the G. S. O. C. bring specimens for inspection and identification, interesting news items are discussed, and there is enough good natured association to make your food digest well. Drop in Thursday noon, and join the gang. The time is 12 Noon until the last person leaves. You are welcome to come in at any point and leave when you feel it is necessary.

* * * * * * * * * * * * *"GEM MINERALS OF OREGON"* * * * * * * * * * * * * * *

Bulletin 7, State Department of Geology and Mineral Industries: 16 pp., 4 pls., 10 cents.

This paper was written in response to a wide public demand for information on the gem mineral resources of Oregon. It is not intended as a technical description of gem stones, but an enumeration of known occurrences. The gem districts discussed are: Beach Deposits; Southwest Oregon;

Central Oregon; and the Willamette Valley. The agates and opals naturally are the main consideration because of their abundance and beauty. There are many other gem stones, including such as diamonds, cinnabar, pyrite, cobaltite, garnets, chromite, hematite, and many others. It is not customary to think of some of these as gems, yet it is a fact that unusual specimens are frequently classed as gems and have unusual beauty. The bulletin is exceedingly valuable as a catalogue of localities and Dr. Dake is to be congratulated on the excellent treatment of a difficult subject.

* * * * * * * * * * * CLAIRE HOLDREDGE LEAVES OREGON * * * * * * * * * * * * *

The G. S. O. C. has temporarily lost a valuable friend, when it was learned that Mr. Claire Holdredge had accepted a position with the Shell Oil Company and was on his way to Colombia, South America. He and his family left Portland for San Francisco on February 17th, and he expected to sail from that port early in March. Upon arrival in San Francisco he found that he was expected to depart immediately for New York and sail from there, which he did, the night of our annual banquet. Mrs. Holdredge and the children will join him later, and it will probably be about three years before we see him again.

The Society must be dear to him, as two letters have already been received, one written on the Streamliner streaming through Wyoming, and one from Bogota (accent on the last syllable). He flew from Barranquilla to Bogota in 3 hours, a trip that on the surface takes three weeks. The elevation of Bogota is 9000 feet and he claims that it takes three breaths to do what two would, in Oregon. Although in the tropics, the nights are cool and topcoats are necessary; the days are comfortably warm, and it is a pleasant climate. Bogota is an ultra-European city of about 140,000 population, and although Spanish is the language of the country, he has heard practically every other important language used.

Incidentally, he wishes to continue receiving the News-Letter, and he made a particular request for the opening guns of correspondence. Air mail reaches him within a week, at a rate of 35¢ per ½ oz., and he suggests thin paper, no margins or paragraphs and "It is surprising how much one can get in a letter." Regular mail takes several weeks.

His address is: Claire P. Holdredge,
Cia de Petroles, Shell de Colombia,
Calle 13, No. 9-20,
Bogota, Colombia.

Greetings to you, Claire, and we hope that you do not forget your promise of some articles on Colombia, for the News-Letter. We remember with a great deal of pleasure, your talks on Africa, and are anxious to hear about the new country. Best of Luck.

* * * * * * * * * * * * * * * * * *DUES* *
* * * * * * * * * * * * * * * * * *ARE *
* * * * * * * * * * * * * * * * * *DUE *

The annual dues are \$3.50, payable to the Geological Society of the Oregon Country and mailed to Mrs. Amza Barr, Secretary, 5417 S.E.99th Ave., Portland, or delivered personally to her or to Leo Simon. Dues are due on March 1st.

THE MYSTERY TRIP.

Leaders: The Musketeers.

Even the write-up this trip is "off the record". If the "Piping Mr. Piper" wishes all of his remarks off the record what else could a poor scribe do but put them there?

Now, the middle of winter doesn't sound like a very good time for the geologists to go out and study gravel deposits, does it? It sounds cold and bleak, windy, rainy, snowy and foggy. On February 20th it was all of these, but they went - sixteen cars of them (about forty-eight in all). It was the best turn-out we've had for some time. The most enthusiastic among us was Miss Carol Schminky, aged three.

It having been announced in a recent bulletin that the Musketeers would lead us on a trip, all this a complete surprise to the Musketeers, they, hardy pioneers, set out to show the Trip Committee what the ladies of this society could do. And we, the ladies, are proud of them. And men, your words of praise are gratifying.

We assembled at eight o'clock across from the Pacific Building as usual. The getaway was only fourteen minutes short of record time. While crossing the Willamette River one of the Musketeers was heard to remark as she looked across the water at the skyline and the thin streak of gold which had burst the bondage of the fog, "Yes, we're getting away in the glory of a sunrise!"

We went out Division Street to the pit of the Portland Sand and Gravel Co., our first stop. It began to rain. It poured. Not even the sand in the pit could "soak it up". The sand was saturated, too. On went the raincoats and up went the umbrellas and they remained so all day.

We stood looking down into the pit from its edge, and wondered if it was worth going down. Mrs. Vance made up her mind. She asked her husband for the car key. "What," he remarked, "giving up already?" "No," she answered, "I've graduated from the gravel pit." But those of us who had not graduated, turned to Mr. Piper for the first "piping" of the morning.

"The gravel exposed in the pit, is presumably part of the so-called 'Portland Delta'", began Mr. Piper, as he pulled his coat collar up closer about his neck, and extinguished his pipe - it was of no use in the deluge. "The altitude here is about 300 feet above sea level, the crest height of the 'delta'".

"The pit face may be divided roughly into three zones, each distinctive in the size of its particles and the type of bedding. In the lowest zone, nearly half of the face, the gravel is roughly stratified, as shown by the variations in color, size of the pebbles, etc. Many appear to be foreset beds, such as are built by a stream as it rolls its sand and gravel over the front of a bar. The inclination of such beds shows the direction of the current of the stream at that point only, and not necessarily the general course of the stream."

"At the top of the lower zone is a thin, light colored layer, which appears to be composed mostly of silt. Such material was doubtless laid down in fairly quiet water. The deposits of the middle zone differ chiefly in that cobbles and boulders are abundant in certain layers, and that the stratification is somewhat less uniform. The top zone, which is much thinner than either of those below, consists of unsorted materials, ranging from boulders to sand in size. The bedding is most uneven. This part of the deposit was formed by a strong constantly shifting current."

The Musketeers then produced a compass, and told us that in places in the lower part of the pit, the compass needle was very much affected by something in the beds. Someone had an answer to that - probably the magnetic properties were due to a concentration of magnetite-from basalt.

Next, our attention was called to the evidence of weathering of the beds immediately below the natural land surface. A pronounced iron stain has penetrated to a depth of about 3 feet, whereas, below, there is very little if any such stain. Thus, weathering alone is not an indication of great age, for here the most intensely weathered beds are obviously the youngest beds of the deposit.

About this time, someone suggested that we really ought to go down into the pit. The hardiest of us began, "I'll go, you going?" And the first thing we knew, we were down there.

From the bottom of the pit, the beds were seen to be less steeply inclined than had appeared from the rim. The lower zone was seen to be composed largely of coarse, uniform sand, the particles being of a size that could be kept in suspension by a vigorous stream. This sand lay in rudely stratified layers, from 2 to 5 feet thick, each nearly horizontal. Several layers were distinctly cross-bedded; such layers obviously comprise the foreset beds of a former stream-bed bar.

The boulders and cobbles in the middle zone, for the most part between 2 inches and 10 inches long, were of a size that the vigorous stream could roll along its bed during freshets. Doubtless these boulders were available in the bars, to be picked up by successive freshets. Mr. Piper stressed the fact that a catastrophic flood was not necessary to account for these materials of the "Portland delta". A stream the size of the Columbia river, or the Sandy river, could have done it.

The boulders included rock types foreign to the vicinity of Portland, as well as types possibly of local origin, such as variously assorted lavas and porphyritic rocks. The most abundant foreign type was quartzite. Others include granite and argillite. The quartzite and other foreign rocks alone do not indicate the age of the deposit. These were probably transported some distance by the river; possibly they were derived from a gravel deposit older than the Portland delta. The question as to how far they were transported arose when Mr. Vance picked up a handful of the coarser sand and pebbles lying between the cobbles. This material was angular, and so could not have been carried far in the stream, or they would have been more rounded.

Our next stop was at the gravel pit of the Warren Construction Company, on the flank of a depression which is about 50 feet deep, and which extends all along the eastern base of Rocky Butte. After scouting about a bit, Mr. Piper, "off the record", began to interpret alternative hypotheses to explain this feature of the Portland delta. It would seem that none is so brave as to challenge "on the record" Bretz's theory of the cause of this depression lying at the base of Rocky Butte and trending southward. (One even moderately cautious might well "fear to tread" at first sight of one bit of the evidence that Bretz has studied intensively over a term of years (A.M.Piper). Bretz has concluded that the depression is a fosse, caused by a strong current impinging against the face of the butte, and so preventing the deposition of gravel. The alternative is that the depression is an abandoned stream channel cut after the "delta" had been built to full height against the flank of the butte. But here the scribe hesitates even "off the record" to reproduce the lines of evidence supporting the alternative points of view. Only one argument stands out clearly. "In weighing the evidence for or against a flood of catastrophic magnitude, one can reason as much by what the flood did not do, as by what it did."

After leaving the gravel pit, we walked over to the base of Rocky Butte, up to the cave where the notorious Harry Tracy hid for several days back in 1902.

Rocky Butte is a remnant of volcanic rock older than the Portland delta. Much of the initial volcanic mass has been removed by erosion. Quartzite pebbles, etc., were found embedded in the lava. It has been found that the lava was extruded through beds of old gravel lying under the delta deposits. These older gravel deposits are the "intra-volcanic gravel", about which we are to hear more, later in the story of this trip. As the lava passed through the gravel, it picked up many pebbles and boulders, at some places clumps of pebbles. By looking at the rock composing the Butte, it becomes evident that the volcanic vent was not far away. The rock contains a wide assortment of volcanic materials. The materials of the Portland delta were laid down around the Butte long after.

After leaving Rocky Butte the caravan proceeded to Troutdale. After a short stop in Troutdale, we crossed the bridge and made a brief stop to view the lava bluff exposed there. This lava overlies a gravel deposit exposed here on both side of the Sandy River. This gravel deposit has been called the Satsop formation, but wishing to avoid inexact correlation, we designated it, according to its position, by a notebook term: "intra-volcanic gravel". It differs from the deposits of the Portland delta in being moderately cemented and commonly, somewhat weathered. It contains a moderate percentage of quartzite pebbles and cobbles at some places; none at all at many places. The lava flow above may have come from any of several nearby volcanic vents, such as Larch Mountain. The slope of the flow leads back to the Corsan plateau.

Our coldest, wettest, snowiest, windiest, and shortest stop was made on the bluff about a mile west of Crown Point, at the site of the old Chanticleer Inn. We took time to note the bluff of Columbia River basalt overlain by the intra-volcanic gravel at Crown Point, also the younger volcanic rocks that overlie the gravel between Crown Point and our vantage point.

When folks get hungry on a trip, what should a leader do? Feed them, of course, but where? It was too cold and wet to adhere to the original log of the trip, so Rooster Rock was forsaken and we hurried on to the cabin in the camp ground at Wahkeena Falls. Who came to the rescue with good dry kindling and an axe? Ray Treasher, of course. It wasn't long before a cheery blaze was roaring up the chimney. In the meantime the freezing ones did the "Big Apple" around the tables. Soon the lunch boxes were opened, and it did not take us long to consume our food. After a while, when folks were beginning to feel chatty and comfortable, Mr. Piper, pipe in hand, was once more found piping notes of wisdom, and like the Pied Piper of Hamelin, drew all the people to him. It was not long until we had reconstructed the sequence of major events told by the rocks seen on our morning trip.

A brief résume of these events, based in part on the comment by Mr. Piper, is as follows: The Columbia River basalt (Coriba) was extruded on top of the Warrendale formation. A time of erosion elapsed, during which time the Coriba surface was greatly defaced and gouged out. Later, these gouges and old stream channels were filled by the intra-volcanic gravel. Next, there was a period of deformation and volcanic activity, during which the overlying lavas were extruded. Then followed a period of erosion and probably several stages of emergence and submergence. The materials of the Portland delta occur over a large area, lying on the younger lavas at some places, and on the intra-volcanic gravel at other places.

On the return trip we stopped at Latourelle Falls, where great columns or pillars of basalt first caught our eye, then the hanging valley of Latourelle Creek. The perpendicular bluff exists because of the pronounced columnar joints. The great cavernous alcove at the base of the falls has been cut by the pounding action of the falling water.

We stopped just east of the "Auto Club" bridge over the Sandy river to look at exposures of a boulder train along the road cut. Here was still another type of gravel deposit, younger than the intra-volcanic gravel, and seemingly younger than any of the volcanic rocks. The particles making up this boulder train are poorly sorted, fairly or poorly rounded, and not at all cemented. Some boulders are as much as 5 feet long. It was concluded tentatively to be the deposit of a stream flowing from a glacier. Similar material was seen capping the bluff just west of the bridge, and resting on the intra-volcanic gravel.

Several stops were made on the hill that ascends to Base Line road from the "Auto Club" bridge, in order to trace the boulder train there so well exposed. Many interesting problems presented themselves, such as the possible correlation of the silt overlying the boulder train with the silt in the Willamette Valley. Many other hows, whys, and wherefores came up for discussion, but we were cold and a wee bit tired even, though now, at last, the sun was threatening to shine and thaw us out. We decided that here was material for another trip and another story. We hurried home via the Base Line road.

Eva Catlin

In defense of their past antics, the Musketeers submit the following:

THE TRUANT TRIO.

Oh! We are the Musketeers
Who get all the laughter and jeers.
We are the ones who dodge the law,
We're the slickest girls you ever saw.

We have even had the nerve, we're told
To lure within our fatal fold
A very meek yet rugged gal
Whom we've made into our pal.

To inspire your confidence again
We feel we must explain
That tho we're painted black as sin
We know it's because of the gang we're in.

We've tried to be so very good
And do the things we always should,
Yet everywhere on earth we go
Our reputations haunt us so.

To sin we close our eyes so tight
Yet find ourselves in many a plight.
If anything should go all wrong
It's always us who brought it on.

And now to all on bended knee
We'd like to make this little plea,
Won't someone show us a way to go
That's free of sin, but not too slow?

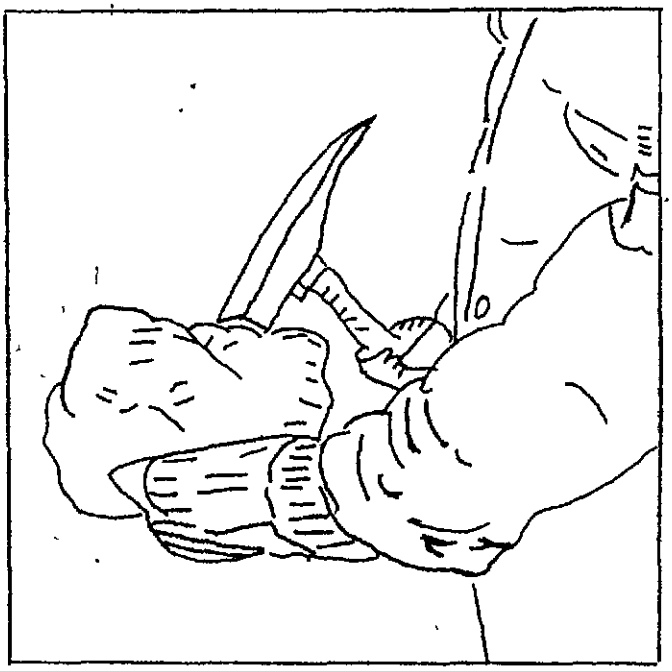
MUSEUM STUFF.

The research committee of the Geological Society of the Oregon Country has already started a series of projects which will do a great deal to further geological knowledge of our particular sphere of influence. They expect to collect suites of fossil specimens for study and identification, and for permanent record in our museum.

Mineral and rock specimens are also highly desirable for study and museum purposes. Individuals and groups are constantly asking for type rocks which they can study, - what does Columbia River basalt look like, or, I've heard of the Clarno formation, but I wouldn't recognize it if it met me on the street.

This Society should give some serious attention to a collection of specimens which represent the various formations found in the Oregon Country. Think what it would mean if we could say, "Here is a collection which shows typical material of every recognized formation in the state of Oregon", or any other area. Such a collection would be invaluable, particularly if accompanied by thin-sectioned slides.

However, museum and display specimens are not just simply chunks of rock, such as we frequently drag in from our field trips. There should be some regularity in shape and size, thus they are more pleasing to the eye and easier to study. And it takes no particularly special training; the newest recruit amateur can learn to make a good museum or "hand" specimen as readily as our most advanced students. The location of type localities can readily be determined, either from the literature or consultation with our geologists.



The finished specimen should be 3 inches by 4 inches, or 3 inches by 5 inches in size, not too thick, and is to be free of hammer marks on the sides. It should be accompanied by several chips or spalls which were broken off during the shaping process. These chips may serve as the basis of thin sections.

Select a piece of rock at least an inch larger each way than the finished piece. It should be free of cracks or joints which might cause it to break into pieces.

The specimen is shaped by striking its edges with a sharp, firm blow of a hammer, while holding it in the other hand. Strike squarely on the edge. Don't be surprised if nothing happens at first. It may take several blows before a piece will spall off. As one edge begins to assume a straight line, turn to the other edges, striking in the same manner, in an attempt to bring it to the finished size.

It will take considerable practice before a good specimen can be turned out, but once the technique is learned, it is never forgotten. The finished piece is something to be proud of, one you will be happy to have in your own collection, or see displayed in a group collection.

It will be too great a task for any one individual to complete an Oregon collection, but if Society members would make collections at each type locality they visit, it will not be long before a complete set will be available. When you do visit such a locality, scout around for likely looking material, and shape up several; one for yourself, and one or more for the Society collection. Incidentally, such a collection would have considerable commercial value, and might be a means of raising some funds for the Society.

This type of work is such that anyone can cooperate. Many have said that they would like to do some research work, but they just don't know enough geology. Here, now, is a research problem which you can handle.

Some of the "Don'ts" are:

DON'T strike too hard.
DON'T strike too many times in one spot. Move the hammer along the edge after each blow.
Don't attempt to make the specimen thinner by striking at projections on the face. This is highly unsuccessful as well as marring the specimen.
DON'T place the specimen against anything solid when striking. It will invariably shatter before shaped. Hold it in your hand; use a stout glove, or are you tough?
DON'T be discouraged when your specimen breaks on the last few shaping blows. It has happened to all of us.
DON'T forget to save chips or spalls of "fresh"rock. Wrap them with the specimen.

LET'S START A COLLECTION OF TYPE OREGON ROCKS.

TESTUBE EMERALDS.

Emeralds have defied science in its endeavor to produce them artificially. Most gems are capable of being so produced, but the emerald has been stubborn and wilful, as well as the most beautiful and enchanting of all the gems. Perhaps that explains some of the similarities of the gem and the Island.

It now appears that the I. G. Garbenindustrie, Germany's greatest chemical firm, has discovered the secret. A 25 carat specimen was recently brought to the American Museum of Natural History by one of the officials of the Company. The stones are prepared from a secret, hot solution, and have characteristics of the natural stones.

RECENT PUBLICATIONS.

Bibliography of North American Geology, 1935 and 1936: U.S.Geological Survey, Bulletin 892, 1937. Obtainable from Superintendent of Documents, Washington, D.C., 50 cents. This recent release by the U.S.G.S. lists all available literature pertaining to North American geology, and quite a number of references to Oregon and Oregon Country geology are included. A search of the bulletin indicates that the following people have published geologic information in the Geological News Letter, the official publication of the Geological Society of the Oregon Country:

Allison, Ira S.	Piper, Arthur M.
Beck, George	Pratt, Allyne F.
Buwalda, John P.	Sanborn, Ethel Ida
Chaney, Ralph	Thayer, Thomas P.
Felts, Wayne M.	Treasher, Ray C.
Hodge, Edwin T.	Weaver, Charles E.
Layfield, Robert	Wilkinson, W. D.
Packard, Earl L.	Holdredge, Clair P.

As soon as a complete and authentic list of members of the Geological Society of the Oregon Country is available, the publication will be searched to determine just who of our members have gained recognition in this bibliography during 1935 and 1936. It may be possible to include their individual bibliographies.

The fact that the U. S. Geological Survey recognizes the Geological News-Letter and some of its writings should be an incentive to members who have data to publish, to get it in satisfactory shape and publish it herewith. The News-Letter can guarantee early publication, and thus benefit those who are interested in the "priority of print".

Minerals: Ward's Natural Science Establishment, Inc., P.O. Box 24, Beechwood Station, Rochester, New York. A catalogue. This is a new edition of their catalogue of minerals; it lists minerals available for sale, as well as rocks, fluorescent minerals and lamps, collections of various kinds, all beautifully illustrated, and printed on pleasing paper. It is understood that copies are issued to educational institutions; to private citizens it has been customary to make a small charge, which may or may not be remitted upon receipt of an order of certain size. It is a most interesting catalogue and worth the small charge usually made for it.

Ward's Mineral Bulletin: same address as above. This publication is issued monthly, Sept. to May, and is free for the asking. It is a 4-page bulletin, and contains items of interest to collectors, as well as containing a great deal of general interesting information.

Leveling in Oregon: Oregon State Planning Board, 720 Spalding Building, Portland, Oregon. This release is a sort of bibliographic index of leveling done in Oregon, and data as to where this information may be secured. The cost, if any, is not known.

Sec. 562, P. L. & R.

DR. ARTHUR C. JONES
2640 S. W. PATTON RD.,
PORTLAND, OREGON

Geological News Letter

Vol. 4 No. 7 Portland, Oregon Apr. 10, 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * * *ANNOUNCEMENT* * * * * * * * * * * * * * *

Lectures

Second and Fourth Fridays, 8:00 P.M., Public Service Auditorium, 3rd floor.

Friday April 8th	:	Mr. Morris Opler, visiting lecturer on Anthropology, Reed College, will lecture on "Ancient Indian Cultures of Central America". Mr. Oper will be remembered for his very interesting and instructive talk on "Indian Culture of the Northwest", last fall.
Friday April 22d	:	Dr. C. B. McCullough, Assistant State Highway Engineer, will show some very interesting pictures taken in connection with some of his work in Central America. These pictures have excited some very favorable comment whenever they are shown and we are particularly fortunate in being able to schedule this lecture.
Friday May 13th	:	Dr. Ethel I. Sanborn, Professor of Botany, Oregon State College, who is a specialist in paleobotany, will discuss the proper methods to use when collecting paleobotanical specimens. Consideration will also be given to the necessary tools. Dr. Sanborn has gained widespread recognition for her work on the Goshen and Comstock flora, and subsequent studies.

Field Trips

Sat.& Sun. Apr.9-10	:	Eugene: arranged by Dr. Warren D. Smith, Head of the Department of Geology, University of Oregon. Dinner, Sat.evening at Eugene, time, 6:30; place, Anchorage, opposite the University, on the Mill Race, Pacific Hwy.South; cost, somewhere between 60¢ and 75¢. After the dinner, the evening will be spent in the new University museum. Sunday, a field trip, led by Dr. Smith. South to Cottage Grove and to Hobart Butte, back to Eugene by way of Lowell-Jasper-Springfield. This is a most interesting trip and we will see many things we have never seen before. Included in the itinerary is a scheduled stop at the famous Goshen fossil-leaf locality. If you are making this trip, advise Mr. Chester A. Wheeler, phone Ga 8243, so that Dr. Smith may know how many to figure on. Accommodations at Eugene include the Osborne and Eugene Hotels, both first class and very nice -- the Osborne slightly lower in prices; there are numerous auto camps, one steam-heated camp north of Eugene.
Sunday April 24	:	Leader, Mr. Orr of Sandy, Oregon, to a fossil locality in the Sandy area. Full particulars later.

New Members

A. E. Harbord
2037 S.E. 7th Ave.
Portland, Oregon

Miss Almeda Smith
Route 1, Box 239,
Sherwood, Oregon

News of our Members

Mr. E. B. MacNaughton spoke over KOIN March 30th for Northwestern Electric's Neighbors' Program. He was interviewed about his hobby of collecting old maps. Mr. MacNaughton is President of the First National Bank and a member of the State Governing Board of the Department of Geology and Mineral Industries.

Mr. Earl K. Nixon, Director of the Dept. G. & M.I., was quoted extensively in the Oregonian of April 3rd and 4th in regard to the so-called "Mystery House" near Grants Pass.

Our president discussed minerals over KEX Wednesday, March 30th. When asked how he got along, he claimed that it was 15 minutes of perspiration. Do you mean "all wet", Ray?

CARAVAN RULES

Whenever any large group of people assemble for group action, it is necessary to formulate a simple set of rules to provide for the greatest benefit to the greatest number of people. It has been some time since we have refreshed our memories about these rules, and some of them are given herewith, with an explanation of the reason.

MEETING PLACE: Unless otherwise specified, the meeting place is on Yamhill Street, between 5th and 6th, at a time set by the trip leader. Please be prompt as the leaders are asked to log their trips and account for the timed stops.

WATCH THE CAR BEHIND YOU: Each car is requested to keep the car immediately following them in sight. If this car drops back or stops for any reason, so should you. In this way, the entire caravan can be stopped. Car trouble frequently develops, or portions of the party may miss a turnoff. If you keep the car behind you in sight, and do not leave a turn from the main line of travel before you are certain that this car also will make the turn, the caravans will proceed more smoothly.

THREE HORN BLASTS will advise the car ahead to stop. It is sometimes desirable to get word forward to the lead-car.

ANSWER THE WHISTLE PROMPTLY: When reaching a stop, assemble quickly. When the leader indicates that it is time to leave, please move promptly. This is done as a courtesy to the leader. He has spent a great deal of valuable time planning this trip; he has his stops scheduled, and if you "jim the detail" by not acting promptly it throws his program all out of kilter.

RESPECT PRIVATE PROPERTY: This rule must be followed if the Society is to remain in the good graces of residents. Many times, we cross private property as a very special concession.

SAFETY FIRST!!! Before disembarking from your cars, be sure that no cars are coming which may bump you and cause an accident. The same applies to all stops along travelled roads. Report all accidents, even minor ones, to the trip leader. We expect to provide first aid equipment, and scratches and small cuts frequently can develop into serious blood poisoning. If leaving the party for any reason, please advise the leader. It may save unnecessary searching.

DISPLAY YOUR SOCIETY STICKERS in the lower right of your windshield and back window. This helps other cars to spot caravan members. It also advertises the Society.

CARAVAN STOPS: The leader should stop the caravan so that the midpoint is opposite the point to be discussed.

Stickers

The Geological Society has been requesting new stickers with which to identify automobiles on the field trips, and also to identify Society members and advertise the Society at times other than field trips.

A new type of sticker has been prepared and is now available. It is similar to the circular shield on the cover page; the size is about 3-3/4 inches diameter. They are printed on gummed and ungummed paper.

There is some cost connected with the printing of these stickers. The plate had to be prepared, and the gummed paper is somewhat expensive as it was deemed advisable to secure the best on the market. For these reasons, it has been decided that the stickers will be disposed at a nominal price of 2 stickers for 5¢. Any profits which may ultimately accrue from their sale will be placed in a fund to provide more plates for the News-Letter, or other official business of the Society.

Even the best gummed paper does not stick too well. It is therefore suggested that for the most permanent results, that the shield be affixed by means of transparent scotch tape around the edge. The combination of the gum and the tape should make the shield a rather permanent feature of your car. For uniformity, it is suggested that the lower right corner of the windshield and the back window (facing as the driver does) be used for placing the stickers.

A word of explanation about the cost of plates. As you know, the Geological Society purchased a new Multigraph-Duplicator to print the News-Letter, and all of volume 4 has been prepared on this machine. Plates of pictures or complicated maps require a photo-process and the cost of these plates, ready to run on the machine is slightly less than $3 each. Our News-Letter budget does not permit this extra cost, so that it is necessary to secure some "outside" assistant for each plate that is printed.

Stationery

Numerous requests have been received for Society stationery. A number of the members would like to have some of our "letter-heads" for their own use. To meet this demand, the following is suggested: that the letter sheet have the Society seal in the upper center, and that an outline map of the "Oregon Country" be printed on the body of the sheet as an underprint. This can be done with pastel inks in such a way as to simulate a water-mark.

The cost of such letter-heads will be about the cost of the paper, plus about ¼¢ per sheet to help defray the cost of the plate.

Those interested in securing such stationery are requested to get in touch with Mr. Tracy Wade; give him your name, address, telephone number and the quantity of sheets desired. If a sufficiently large demand is found to justify the expense of the plates, the stationery will be provided.

The Wallowa Mountain Camp

The summer camp is set for the first two weeks of July. Several things have entered into the choice of this time. The most important reason is that the State Department of Geology and Mineral Industries will have a party in the Wallowa country under the leadership of Prof. Warren D. Smith. Plans are now being considered that will enable us to take full advantage of the opportunity to observe this party of professional geologists at work without interfering with their duties.

A second factor that appeared important in the choice of dates was the moon. What better time to be on a camping trip than during the full of the moon? And of course the earlier in the season, the less heat, was considered also.

Letters are now out in search of a camp site. Hotels and auto camps will be asked to submit their lowest rates. The possibility of finding accommodations at some mountain ranch is being investigated. The supervisor of the Wallowa National Forest has been asked to submit the names of men who cook for their camps, if we decide to establish our headquarters in one of the forest camps. The forest service has also been asked to supply data on the forest camps available and about the condition of the roads within the forests. It is our desire to provide the members of the Society with a big outing at the mest reasonable rates possible.

But to carry on from here it is now up to those who wish to attend this camp to signify their intention of doing so.

WRITE A CARD NOW to
H. B. Schminky
1030 S.E. 54th Ave.
Portland, Oregon.

I have been asked to act as chairman of the summer camp committee. The members of the committee will be those intending to go on the trip. The meetings of the committee will be called after each Society meeting until all details of the camp are completed.

Respectfully submitted by:

H. B. Schminky, Chairman,
Summer Camp Committee.

* * * * * * * * * * * * * * * *LUNCHEON FLASHES* * * * * * * * * * * * * * *

March 24th: Dr. Adams showed what had been done in some community with highway signs explaining the geology of the region.

Mr. Vance showed an Aztec Calendar stone brought from Mexico by Mr. Orrin Stanley. Mr. Stanley also told of some of the geology of Mexico.

Mr. Stewart of the United Air Lines was a guest. He was formerly geologist for the Sun Oil Company.

March 31st: Have you seen the new Geological Society of Oregon Country stickers? These were displayed at our noonday luncheon. They are very attractive and all drivers will want them for their cars. Selling price is two for five cents.

Jack Stevens who has been out of town since the Annual Banquet gave an interesting discussion on Water Right on Rio Grande.

Arthur Piper gave an interesting discussion on Water Right at the stream head with reference to certain decisions handed down regarding these rights on Clark's Fork of Columbia. Dr.Osgood remarked he was leaving shortly for extended trip through east, return by way of South. Some members of group told him of things of geological interest he should visit along the way.

* * * * * * * * * * * * * * * * * * REVIEWS * * * * * * * * * * * * * * * * * *

Methods in Paleontology, by Charles L. Camp and G. Douglas Hanna; University of California Press, 1937; 153 pages, $2.50.

This is a manual of field and laboratory methods in the collection and preparation of vertebrate and invertebrate material. The vertebrate section is written by Dr. Camp of the Museum of Paleontology of the University of California and the Invertebrate section by Dr. Hanna of the California Academy of Sciences. This is not a book to be read and filed away on a shelf but one to be kept at hand closely for frequent use and study until it is thoroughly absorbed.

For the Paleontologist, particularly the amateur paleontologist, it is the kind of a book to which a noted book collector referred when he said, "One should own three copies, one to read, one to keep and one ~~to~~ not lend". This is, for us, probably an overstatement but a copy certainly would be out of place in any member's library and this should not be the borrowed copy.

I believe that most members are like myself, in that I have frequently dreamed, and still do, of finding THE fossil that will answer many scientific questions. Since studying Dr. Camp and Hanna's book I am convinced that it is a fine thing that I have not yet found it, because it might then have been lost forever through improper removal or inaccurate location. In the text, emphasis is placed upon the responsibility that any collector assumes upon the removal of material and the serious permanent losses resulting from carelessness and ignorance of proper methods. It seems to be the principal purpose of the manual to guard against these losses. Every membersshould, at least, read the book carefully so that these responsibilities and the general ethics of collecting will be fully realized.

A brief outline of indexed subjects follows: adhesives; bandaging methods; field work; cataloguing; dynamite, use of; excavating methods; grinding wheels; hardening fluids; ivory tusks, preservation; jacketing; leaves, handling of; micro-fossils; notebook data; occurrence of fossils; permits for collecting; quarrying; rock matrices; prospecting for fossils; sandstone, fossils in; tools; wood, structure of, etc. etc. All of these subjects are covered in considerable detail and one may have at hand workable instructions even to the preparation of your sour-dough bread.

Copies of this book will soon be in the Portland Public Library and we hope in the hands of many of the members.

- Tracy Wade.

* * * * * * * * * * * * * * * * * DUES * * * * * * * * * * * * * * * * * *

Cards are being mailed as notices that dues are due, to all unpaid members. The last News-Letter stated that no more issues would be mailed to delinquent members; however, it was felt that news about the Eugene trip should be sent to all.

No. 8 definitely will be mailed only to those who are in good standing. Better hurry, as No. 8 will contain a very valuable supplement.

* * * * * * * * * * * * * * SPECIAL SUPPLEMENT * * * * * * * * * * * * * *

Vol.4, No. 8 of the News-Letter, in press by March 20th, will have as a special supplement, a full size article by Dr. Edwin T. Hodge on "Economic Minerals in Oregon". This is an exceedingly valuable paper to anyone interested in the economic development of Oregon by an authority second to none.

This Special Supplement is further proof of the increased value of the News-Letter to our members.

Don't miss it!

* * * * * * * * * * * * * * * * PHIL BROGAN * * * * * * * * * * * * * * * *

and

PORT ORFORD METEORITE.

In the March 28th Oregonian, our fellow-member Phil Brogan, had an article on the famous Port Orford meteorite. Mr. Brogan is remembered for his very interesting presentation of "News Stories of Ancient Oregon" at the Annual Banquet in February.

The Port Orford meteorite was discovered by Dr. John Evans, U.S.Government geologist in 1859, and the only location given was "about 40 miles from Port Orford, Oregon". The Bibliography of Oregon Geology, item 884, quotes from the American Journal of Science, 2nd ser., v.32, no.96, pp.311-318, Nov.1861, to the effect that Dr. Evans discovered an enormous mass of meteoric iron containing an abundance of chrysolite or olivine. He tried to get an appropriation from Congress to move the meteorite but the Civil War interfered and the matter was fofgotten. The mass was estimated as being three to four feet thick, Two fragments of the meteorite are known to exist, one in the Smithsonian Institution at Washington, and one in the Vienna Academy of Science. The latter institution analyzed it. The death of Dr. Evans brought the Port Orford meteorite episode to a close and subsequent efforts to locate it have been of no avail, and its location has been one of the great mysteries of the Oregon Country.

According to Mr. Borgan, the University of Oregon's astronomer, Professor J. Hugh Pruett, has received a letter from the Vienna Academy of Science which states that they not only have a fragment of the meteorite but also a record of the original report of the discovery. It may be possible that the meteorite will yet be found.

Recent articles in newspapers about meteorites and their value has stimulated additional search for meteorites and they are being "discovered" all over Oregon. To date, none have proved authentic, but out of the search may come some real finds. The location of a meteorite after its fall is quite a difficult task. Each person who saw the meteorite flash through the sky, knows exactly where it struck the ground. Actual check on these observations shows the the place of impact observed is frequently as much as 150 miles from the true location. The explanation is that the blinding light, and the surrounding darkness seriously interfere with the observer's sense of proportion, and he is positive that he knows the point of impact, and actually he does not. So the finding of a meteorite after its fall is a slow, painstaking task. All stories must be traced to their source, the data platted on a map and a search begun.

Oregon already has one famous meteorite, the Willamette Meteorite, which was found near the city of Portland, and was exhibited at the World's Fair here. There is considerable controversy regarding its origin, and it is the opinion of many students that the meteorite was rafted as an erratic to its location. Joe Wimmer discussed this matter in an earlier issue of the News-Letter.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed

Sec. 562, P.L.& R.

DR. ARTHUR C. JONES
2610 S. W. PATTON RD.,
PORTLAND, OREGON

Geological News Letter

Vol. 4 No. 8 | Portland, Oregon | Apr. 25, 1938

SUPPLEMENT NO. 1

Price 25¢

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

EDITOR:

Edwin T. Hodge,
2915 N.W.Luray Terrace,
Portland, Oregon.

BUSINESS MANAGER

Raymond L. Baldwin
2725 N.E. 50th Avenue
Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

Geological News Letter

Vol. 4 No. 8 Portland, Oregon Apr. 25, 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * * *

Field Trips.

Sunday April 24th	Leader, Mr. Orr, of Sandy, Oregon, to a fossil locality in the Sandy area. Caravan leaves at 8:00 A.M. sharp from starting place at 6th and Yamhill. Those not wishing to caravan be at Sandy High School 9:00 A. M.
Sunday May 15th	Table Mountain Leader: Franklin Davis
Week End May 28th-29th 30th	John Day River and Clarno Region. Leader: A. W. Hancock.
Sunday June 12th	Bull Run Dam Leader: B. S. Morrow.

Lectures.

Friday April 22nd	Dr. C. B. McCullough, Assistant State Highway Engineer, will show some very interesting pictures taken in connection with some of his work in Central America. These pictures have excited some very favorable comment whenever they are shown and we are particularly fortunate in being able to schedule this lecture.
Friday May 13th	Dr. Ethel I. Sanborn, Professor of Botany, Oregon State College, who is a specialist in paleobotany, will discuss the proper methods to use when collecting paleobotanical specimens. Consideration will also be given to the necessary tools. Dr. Sanborn has gained widespread recognition for her work on the Goshen and Comstock flora, and subsequent studies.
Friday May 27th	Mr. Earl K. Nixon, subject to be announced later.

New Members.

Mrs. Grace Doughty
1215 N.E. 84th Ave.
Portland, Oregon

Paul W. Howell
920 Lincoln St.
Klamath Falls, Oregon

WALLOWA LAKE CAMP.

The following rates have been offered to our group by the two places operating camp grounds at Wallowa Lake:

1. Williamson's.

Meals for entire party $1.50 per day per person, or $18.00 for a maximum stay of 12 days.
Cabins completely furnished - will accommodate 4 people, $48 for 12 days.

Cabins with two beds - no bedding, $40 for 12 days.
One tent for 3 people $2.00 per day.
One tent for 3 people $1.50 per day.
Camp ground available free with meals.
This would make the maximum cost per person about $30 in the furnished cabins (4 people) and the minimum cost (if you have your own camping equipment) $18 for 12 days.
Horses rent at $2.50 per day.
Boats are available for the lake.

2. Wallowa Lake Lodge.

Room, with bath, and meals in the Lodge, 2 people, $42.50 per week.
" " 4 people, $63.00 per week.
Room, without bath, and meals in the Lodge,
2 people, $39.50 per week
4 people, $60.00 per week.
Cabins with bedding:
2 double beds, $11.00 per week.
1 double bed, $ 7.50 per week.
Cabins without bedding, $5.00 per week.
Tents, $5.00 per week.
Camping place, $3.00 per week.
Cabins, tents and campers have use of showers in the Lodge.
Meals at the Lodge for those using cabins, tents, or camp grounds. $12.25 per person per week.
Maximum cost per person per week at Lodge $15.75. Minimum cost using camp ground $12.25 plus share of camp ground fee.
Horses rent for $2.50 per day.
Boats for use on lake $2.00 per day.
It is the desire of the management of the Lodge to make it as cheap to have everyone stay in the Lodge as to take any of their other accommodations.

Both operators have contacted me personally and both seem to be very much interested in trying to give us the best that they have.

Will everyone interested in having this camp be at the next Society meeting to discuss this choice, following the lecture?

H. B. Schminky.

* * * * * * * * * * * * * * * * * * *MAILING LIST* * * * * * * * * * * * * * * * * * * *

We have been hearing it said that our mailing list is not kept up to date. Last fall we put out a directory giving names, addresses and telephone numbers of all those who had been members of our Society for the past two years. We were pretty sure some of these addresses were not correct, but they were the last ones given us. If a member moves and does not notify us, we do not see how we can be blamed for sending mail to the old address. If your bulletin is not reaching you as it should will you please check and find out if we have your proper address??????

SERVICE COMMITTEE REPORT

Tracy Wade, Chairman

Following is a list of bulletins in print of the University of California Press relating to the Oregon Country.

Volume	Number	Date	Author	Title	Price
9	1	1915	Merriam	Hipparion Condoni	.25
9	2	1915	Clark	California Oligocene Correlations with Oregon and Washington	.25
9	11	1916	Chandler	Bison Antiguus - Pacific Coast	.25
9	16	1916	Packard	Mesozoic and Cenozoic Mactrinae of the Pacific Coast	1.00
10	7	1916	Merriam	Pliocene Bear - Rattlesnake Formation	.25
10	9	1916	Merriam	Mammalian Remains, Ironside, Oregon	.25
10	12	1917	Dice	Tertiary Logomorphs - John Day	.25
10	13	1917	Nomland	Fossil Corals - Pacific Coast	.25
10	22	1917	Merriam	Pliocene Mammalian Faunas	.25
10	25	1918	Merriam	Mammalian Paleontology - Lake Lahontan	.25
12	3	1921	Merriam	Paleontological Research - Pacific Coast	.35
13	8	1922	Stock	Marsupial from John Day Formation	.25
14	3	1922	Howe	Empire Formation - Faunal Relations	.35
14	4	1922	Clark	New Family and New Genus from John Day	.25
15	4	1925	Clark	Pelecypoda - Marine Oligocene	.75
16	12	1927	Schenck	Marine Oligocene of Oregon	.25
17	9	1928	Cushman & Schenck	Two foraminiferal faunules from Oregon Tertiary	25
18	1	1928	Schenck	Western Oregon Oligocene	.50
19	4	1930	Stauffer	Devonian of California and S.W. Oregon	.50
19	9	1930	Merriam	Allocyon, a new Canid from John Day Beds	.25
19	19	1931	Schenck	Genus Aturia, Western North America	.50
20	3	1931	Miller	An Auklet from Oregon Eocene	.25
20	5	1931	Etherington	Astoria Miocene, Fauna and Stratigraphy	1.25
23	6	1933	Williams	Mt.Thielsen, a Dissected Volcano	.25
23	11	1935	Hinds	Mesozoic and Cenozoic Eruptive Rocks of the Klamath Mountains	.75
23	13	1935	Stirton	Tertiary Beavers	1.00
24	9	1937	Verhoogen	Mt.St.Helens, a Recent Cascade Volcano	.65
		1937	Camp and Hanna	Methods in Paleontology	2.50

These publications may be obtained by Society members at substantial discounts, when orders are consolidated through the Service Committee.

Arrangements have been made through a local firm for Society members to obtain discounts on the Estwing Geologist's hammer with either pick or chisel point. This is a guaranteed tool and plenty tough for any of us. Members interested should communicate with the Service Committee.

We have been advised by the Oregon State Board of Geology and Mineral Industries that Society members may obtain discounts on their publications when orders of twenty or more are grouped. To us this is a particularly pertinent series of bulletins and members desiring copies should order through the Service Committee.

Society members wishing to take advantage of this service should contact Mr. Wade.

EDITORIAL COMMENT.

In looking over the News Letters for the past year it has come to our attention that we have no report on several of the trips. All of these trips have been interesting and in the main, well attended. When we take into account the weather conditions during the past year it makes one wonder if our trip leaders might have slipped one over on the weather man by occasionally planning trips for the first and third Sundays of the month.

Seriously, we feel that the interest shown by members going on the trips indicates they felt the trips well worth while, and the high lights should have been recorded. We realize the trip leaders have put a lot of work on the preparation for the trips, and we also feel that they are in the best position to tell us about what they wishes us to see.

Therefore, in the future we are asking the trip-leaders to make a written report on their particular trip. Such a report should be prepared to go in the issue of the News-Letter following the trip, and will serve a double purpose. First: it will keep fresh in the minds of those who went on the trip, the things they saw and heard about. Second: it will bring forcibly to the attention of those members who did not make the trip, those things they missed by not being on the trip.

Below is given a list of some of the trips on which no reports were turned in. Some of these trips were taken over a year ago. Who will volunteer to look back through their notes and give us a write-up on any of these trips?

February 21, 1936.	Northern Washington County. Trip leaders: R. Reynolds and Bruce Schminky.
May 29-31, 1937.	Trip to Bend. Leaders: Bend Society.
July 4, 1937	Mystery trip on Sandy River. Leader: Bruce Schminky.
July 18, 1937.	Boat trip to Bonneville through Columbia Gorge.
December 12, 1937.	Buxton area. Leader: Bruce Schminky.
Jan. 9, 1938.	Salem-Silverton area. Leader: Ray Treasher (forthcoming in Clay Bulletin of State Dept. of Geology).

Likewise, in checking over our meetings we find that during the past year there were many which are unrecorded except for the notice that such a meeting was to be held. The lectures have been good, and were well attended; some reviewed recent literature, others were accounts of actual work carried out through original investigation. These talks should be preserved and go down in records of our Society. The speakers have often come at great sacrifice and expense to themselves in order that they might keep a date made to appear on our programs. It would seem best, if speaker has no time to write the article, the notes should be turned over to us, so some one of the Society can write them for publication, the article then to be submitted to speaker for approval and correction.

Feb. 12, 1937.	Lecture - Mineral Waters of Oregon and Elsewhere. Dr. David B. Charleston.
May 14, 1938 or 1937	The Geology of the Bear Creek Dam. B. S. Morrow.
May 28	Fluorescent Minerals: Dr H. C. Dake
June 25, 1937.	Bonneville and Industry: Dr. Hodge.
Oct. 8, 1937.	Limestones of Oregon and Washington: Dr. Lazell.
Nov. 12, 1937.	Indian Cultures of Northwest: Prof. M. E. Opler.
April 8, 1938	Ancient Indian Cultures of the Southwest: Prof. M. E. Opler
Nov. 26, 1937	The Microscope in Geology: Dr. Francis Jones.
Jan. 14, 1938	Geomorphology of Oregon, or the Evolution of Oregon's Facial Expression: Dr. Warren D. Smith.
Jan. 28, 1938	Features of Geological Material in relation to the occurrence of ground water: A. M. Piper.
Mar. 25, 1938.	The Geological Book of John Day country: A. W. Hancock.

SANDY RIVER TRIP, Sunday, March 27, 1938.

As one (rank) geologist to another, what would you do if asked to lead a trip? In the past when around the real geologists our specialty has been listening in rapt attention, but never uttering an opinion. There was only one thing to be done, find some one or ones, who would "come to the aid of the party". And we did succeed in securing some excellent helpers, whom we will mention soon.

For many years the Sandy River Canyon near Sandy, Oregon, had intrigued us greatly. Why the immense clay deposits and why such a deep canyon? We decided this vicinity was to be our goal for the day.

The Caravan, having assembled at eight-thirty, at 6th and Yamhill, was off to a flying start and with the promise of clear skies. We stopped at Gresham about nine o'clock to gather some more of our party, and we now numbered twenty-two cars.

Our first stop at Eris (first helper) Farm, Kelso, gave us some unusual Indian artifacts to view and ponder over. President Treasher and ex-president Vance had a few pointed remarks about a faceted pebble found here. No agreement could be reached on "Indian Graves" or what you have, located on this farm. Mr. Simon spoke briefly on early Spring flowers.

We now headed our Caravan to the Sandy High School. Prof. Orr (second helper) who is somewhat of a geologist as we have discovered, very graciously welcomed us. Because of considerable work on his part and that of some of his students, the members of the Caravan were treated to a splendid display of Indian artifacts and a number of peculiar fossil bones. As usual, an argument arose as to whether certain specimens were agatized bone or wood. This question may be answered on our April 24th trip, to be led by Prof. Orr and Mr. Markwart, into territory where these fossils were found. Prof. Orr mentioned the possibility of archaeological discoveries along the ridge from Sandy northward to the Columbia River. He, as a biologist, called our attention to "the great Newt" (this one pickled) which has been the subject of much discussion recently.

After this pleasant bit of biology we were hungry. Luncheon was served at noon, with a cold westerly wind, around the fireplace of the one-time Marvel Inn, which was destroyed by fire some years ago.

A magnificent panorama spread before our eyes at this spot. We noted ancient terraces of Sandy River. They were clearly defined at almost regular intervals. We can see here, so plainly, the time element needed in the shaping of our present contours. Great cliffs of clay extend along River, which contain some "hard-to-get-out" fossils. Some high banks show river bedding in almost perfect bands. (Please note, an amateur geologist is doing her "best").

Our visitors were introduced at this time and we surely enjoyed having such a nice turn out. All seemed to enjoy the discussions and banter around "fire" in fire-place.

The caravan, once more under way, proceeded through town of Sandy to Logus' Farm (helper three). Just one word before leaving Sandy. Prof. Orr mentioned that here we have a Miniature Pirate Stream, Tickle Creek, which has usurped drainage from Sandy River.

Back to the Logus Farm. Here we saw traces of Old Oregon Trail and heard stories of pioneers and of Indians who had a trading post on this spot in early times. The party walked to Sandy River and investigated the banks. Rhododendron Formation shows up in river bed and along banks and is eroded in some interesting shapes.

At the invitation of Mr. and Mrs. Haywood (helpers four and five) we were privileged to enter their uniquely beautiful lodge with its huge fireplace and its front porch of fossilized wood.

After having had an ideal day for our trip, it now started our usual and customary downpour, so we decided to call it a day.

This trip was to have included the region around Roslyn Lake. We thought we had found some glacial deposits, but more of that some other time - meanwhile "happy diggings".

Mrs. Chester Wheeler.

* REVIEWS *

Verhoogen, Jean, "Mount St. Helens: A Recent Cascade Volcano", University of California Publications in Geology, Dept. of Geological Sciences, Bulletin vol. 24, no. 9, pp. 263-302, 4 pls., 13 figs., incl. maps, 1937

Text is largely devoted to petrography of volcanic rocks from St. Helens region. General geology and physiography are briefly discussed; geologic history of the cone itself given in more detail. On a basement of Eocene sediments, volcanic activity and deformation beginning in early Tertiary built up a platform chiefly of Keechelus andesites; this was worn down by glaciation; present mountain built up by volcanic activity beginning in late Pleistocene, continuing almost to the present.

The present cone is composed of thin beds of olivine basalt and andesites, local mudflows and pyroclastic deposits, and recent pumice cover.

(see extreme last page)

(continued from page 84)

Plugs are identified at Butte Camp, Goat Rock, and Sugar Cone. Recent pahoehoe flows cover western and southwestern slopes; these display typical features: ropy surface, lava tubes, tree molds. Age of some flows estimated as 100 years; one flow on northwest side has no pumice cover, assumed to date from 1854. (Latest pumice eruption reported in 1842 covered adjacent areas but not this flow). The mountain is younger than Thielsen, cones of Lassen Peak region, or Crater Lake.

Glacial deposits are very briefly discussed. Existing glaciers are not described.

The paper is a valuable addition to the library of any one interested in the geology of the Oregon country.

Kenneth N. Phillips.

STATUS OF MEMBERSHIP.

Mrs. Barr, secretary, reports that 93 members have paid their dues, or definitely signified their intention of so doing at an early date. Some 39 are on our list as not having signified their intention, and are herewith classed as delinquent.

This response is most gratifying. The benefits our members are receiving make a constantly growing list; a News-Letter of wider scope, and discounts on publications and equipment. Your membership is valuable, and should be so guarded.

A correct membership list will be published in the next issue of the News-Letter.

GEOLOGICAL NEWS-LETTER
A Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg.,Portland,Oregon
POSTMASTER: Return Postage Guaranteed

PORTLAND OREGON

Sec.562,P.L.& R.

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

MINERAL DEPOSITS OF OREGON

by Edwin T. Hodge

INTRODUCTION

Many of the non-metals and a large number of the metals have been reported in Oregon and, indeed, it can be said from personal knowledge that they do occur in the localities reported but in "specimen" occurrences only.

The problem before those interested in developing the potential mineral resources of Oregon is a much more complex one that that which faces other states. This problem is made more difficult of solution because the interests of our people are centered in farming, forestry, and fisheries. Were the people primarily interested in mineral industries and were they to give their financial and intelligent attention, the problem would still be hard to solve. In the first place in western Oregon a deep soil and vegetable cover hides most of the outcrops, and in eastern Oregon lava mantles much of the surface. Mineral deposits are rarely found even in the most favorable localities, hence their value. If mines were as common as farms, then the market would suffer from a plethora of supply and the government would be harassed by the problem of balance, production and consumption. On the contrary, minerals basic to industry and vital to our progress and survival in times of war are rare. The supply just keeps up to consumption from one part of the country to another distant locality. For example, in 1929 Oregon imported 13,396,000 tons of all goods of which 3,944,000 tons were minerals. The value of all imports in the same year was about \$708,000,000 of which about \$75,300,000 in value were minerals. About one-fourth in tonnage and one-ninth in value of all imports were minerals. Our production of minerals in the same year was \$6,876,703. Oregon produced only about 9% of the minerals she herself consumed. Thus \$6,842,297 is spent annually in excess of our own production to meet our needs.

MINERAL PRODUCTION OF OREGON IN 1929 and 1935*.

		1929 Quantity	1929 Value	1935 Quantity	1935 Value
Briquets, fuel	Short tons				
Cement	Barrels	(1)	(1)	(1)	(1)
Clay Products			709,494	(2)	(2)
Clay, raw	Short tons	1,319	2,236		
Coal	do	(1)	(1)	(1)	(1)
Copper	Pounds	655,746	115,411	397,000	32,951
Diatomite	Short tons	(1)	(1)	(1)	(1)
Gems and Precious Stones			(4)		
Gold	Troy ounces	17,092	353,323	52,920	1,852,200
Lead	Short tons	10	1,271	30	2,400
Lime	Short tons	2,486	40,406	(1)	(1)
Mercury	flasks (76 lb.)	3,657	446,684	3,456	248,798
Mineral waters	Gallons sold	(4)	(4)	(4)	(4)
Ores (crude) etc.					
Copper	Short tons	3,836	(3)		
Dry and siliceous (told & silver)	Short tons	6,673	(3)	61,842*	(3)*
Lead-zinc	Short tons			300	(3)
Platinum & allied metals	Troy ounces	12	870	119	(1)
pumice	Short tons	109	3,144	(1)	(1)
Sand and gravel	Short tons	2,257,338	1,508,787	**	**
Silver		30,009	15,995	110,100	79,134
Stone		1,951,890	1,905,747	(1)	(1)
Zinc					
Miscellaneous			2,491,653		

U. S. Bureau of Mines, "Mineral Resources of the United States (1932) (1936)

(1) Value included under "Miscellaneous
(2) Undistributed
(3) Not valued as ore, value of recoverable metal content included under the metals.
(4) No canvass
* 1929-1934
** Included with Montana

GENERAL MINERAL OCCURRENCES

The following summarized history of mining in Oregon appears in the Lindgren volume "Ore Deposits of the Western States," published by the American Institute of Mining Engineers.

"When gold was discovered in California, Oregonians were among the first outsiders to rush to the find. In the earlier days the route of agriculturist immigrants to California had often been through Oregon. After 1848 and apparently not before, there were men trained to search for gold, and about 1850 placer gold was discovered in southern Oregon and lode mines shortly afterward. Eastern Oregon placers were found in 1861. These two districts, the one bordering on northern California, and the other bordering on western Idaho, are the only mineral producing districts discovered to date in Oregon. Details from 1904 to 1932 will be found in the yearly chapter on gold, silver, copper, and lead in Oregon, Mineral Resources of the United States (U.S.Bureau of Mines) and earlier details in Mint Reports. The total value of Oregon production, 1852-1932, has been $111,588,044. Of this gold has totaled $103,242,000,the output of silver has been 4,056,671 fine ounces, copper 21,947,149 pounds, lead 430,790 pounds, and zinc 12,528 pounds."

In this brief chapter no attempt will be made to repeat the information on mineral occurrence nor to summarize the extensive literature. To those interested the best summary of all existing publications will be found in Bibliography of Geology and Mineral Resources of Oregon by R. C. Treasher and E. T. Hodge published by Oregon State Planning Board, 1936.

Trap rock, mostly basalt, but including some andesite, rhyolite, and granite has been quarried in nearly every county in the State, mostly for road metal and building aggregate.

From time to time small quantities of granite and some volcanic tuff are quarried for monumental and building purposes.

Also, large quantities of common clay are dug and burnt for drain, common brick and other similar uses in many counties, usually as a seasonal enterprise. Sand and gravel are mined in great quantities for construction and other uses in every county of the State.

The above non-metal industries exceed by a large figure both the tonnage and the value of the metals mined. Because of this fact Multnomah County, for instance, is a more productive mineral county than either Baker, Jackson, or Josephine.

Copper usually occurs in Oregon closely associated with gold and silver. Some of the more distinctly copper ores are found in the Homestead district on the Snake River, where it occurs as chalcocite and chalcopyrite in shear zones of greenstone. Another important area in the copper belt in the lower Powder river valley, where chalcopyrite, chalcocite and cuprite are found disseminated through the scattered and sheared greenstone.

Some copper prospects are found in the Wallowa district, where the minerals are mainly chalcopyrite in a contact deposit between granodiorite and limestone.

Another copper district is the Waldo, some twenty miles southwest of Grants Pass. Here it occurs as chalcopyrite. The production from this district to date has amounted to approximately three million pounds, in spite of a long transportation charge to a market. The copper properties in this section will receive considerable impetus in their development on the completion of the roads and other transportation facilities here.

Oregon contains numerous scattered coal fields, the most important of which is the Coos Bay field in the southwestern part of the State, named from the fact that it entirely surrounded that body of water. The Coos Bay region is the only one that had recorded a steady production.

There are no mines in Oregon at the present time which are operated primarily for the production of lead. It is a common constituent of the base ores of gold and silver and in greater or less quantities occurs in several districts in both eastern and western Oregon, especially in Lane and Baker counties.

The mountains of southwestern Oregon and northern California have long been known as a source of platinum. The high value of the metal makes the occurrence important.

Peridotite and serpentine derived from it are generally considered to be the native rocks of platinum, and the abundance of serpentine in southwestern Oregon may account for the occurrence of it there, although platinum has not yet been found in place. The production is secured chiefly from beach placer mines and associated with black sands.

Quicksilver is widely distributed in southwestern Oregon and traces of its ore, cinnabar, can be found in concentrates of nearly all of the placer mines. At a few points there has been extensive prospecting.

A deposit of nickel ore in which the nickel is present as the green silicate, genthite, occurs a few miles west of Riddle on Nickel mountain. Peridotite partly changed to serpentine has resulted in the formation of a body of nickel ore sufficiently large to suggest the possibility of successful mining. The Oregon Nickel Mines Company has prospected it quite extensively, but it has not been worked.

Molybdenum has been found in a few localities in the state, the most noted of which is in the contact deposits in the Wallowa district previously referred to under copper. The metal occurs as molybdenite, the sulphide of molybdenum, and is associated with such minerals as molybdite, chalcopyrite, pyrite, magnetite, quartz, calcite, garnet and epidote.

Antimony is found in numerous sections of the State, usually in the form of stibnite, the sulphide ofantimony. Prospects are found in the Upper Applegate district, Jackson county, near Watkins and on Forest Creek in the same district. These ores are said to be of value and to contain gold and silver.

Stibnite is also found in Big Boulder Creek four miles east from Susanville in Grant County.

Chromite is ordinarily found in the vicinity of serpentine areas. Quite extensive areas of serpentine are found in the southwestern Oregon counties, also in Wheeler, Grant, and Baker counties. In all of the localities chromite has been found, but the chief places of importance are near Canyon City in Grant County and in the Waldo district in Josephine County.

COUNTY MINERAL OCCURRENCES

In the last few years a number of "spot" maps have been made. These maps record by symbols and spots the occurrence of minerals in the various parts of Oregon. Five maps have been made by five different organizations and no two of them agree.

The author has gone over these maps and records below the occurrences that he knows to exist and indicates his opinion on the other occurrences.

In addition he has added some important occurrences not previously recorded.

The known and important mineral occurrences in the various counties may be summed up as follows:

CLATSOP.

Clay residual soils and interbedded clays of late Tertiary age.
Coal, thin ashy lignites of probable Eocene age.
Iron, bog ore limonite deposits on the surface of Miocene basalts.
Chromite and Mononozite reported but of doubtful occurrence.

COLUMBIA.

Iron, coal, and clay as in Clatsop, but here the iron ore beds are much more extensive.

Salt, bromine and lead reported, but of doubtful occurrence.

TILLAMOOK.

Gold, chromium and spinel in sparse occurrence in beach and elevated terrace sands.

WASHINGTON.

Iron and clay as in Clatsop. The iron ore was intensively mined near Oswego.

MULTNOMAH.

Clays in flood plain and perched river terraces.
An immense sand, gravel and basalt quarry industry.

CLACKAMAS.

Iron and clay as in Clatsop.

Gold in terrace gravels in the upper reaches of the stream and in vein quartz (Ogle district).

Limestone, impure, in marine Oligocene beds.

Mercury associated with Pliocene intrusions into older fractured rocks.

Asbestos reported but of doubtful occurrence.

YAMHILL.

Saline wells and common clays.
Iron, gold, chromite reported but of doubtful occurrence.

POLK.

Limestones as in Clackamas.
Asbestos, chromite, gold reported but of doubtful occurrence.

MARION.

Copper, lead and zinc in complex sulphide ores in the North Santiam district.

Gold in terrace gravels in streams of the Cascade Mountains and associated with complex ores.

Iron and manganese reported but of doubtful occurrence.

LINN.

Limestone and mercury as in Clackamas, and clay as in Clatsop counties.

Copper, lead, gold, and silver as complex sulphides ores in the Quartzite district.

Diatomite, chromite, and iron reported but of doubtful occurrence.

BENTON.

Limestone as in Clatsop County.
Clay, common red clay.
Chromite and iron reported but of doubtful occurrence.

LINCOLN.

Coal as in Clatsop County.
Gold, chromite, magnetite as in Tillamook County.

LANE.

Copper, zinc, lead with associated gold and silver occur in complex sulphide ores in the Blue River and Bohemia districts.

Mercury associated with late volcanics in the Black Butte district.

Calcite, limonite, bornite occur as gangue in sulphide ores.

Clay as common or as altered tuffs associated with late volcanics and often contain mercury and orpiment, and as sandy Pleistocene terrace clays.

Manganese stems and small veins, brittle asbestos and cobalt (very rare) occur but give no promise of economic importance.

Saline cold and thermal springs.

DOUGLAS.

Nickel as a lateritic alteration of saxonite rocks at Riddle.

Copper, lead, zinc with associated gold occur in complex sulphide ores at Green Mountain and Drew Creek districts.

Gold occurs in stream gravels.

Limestone occurs in tertiary marine strata.

Saline water in springs.

Cobalt as rare associate in some metal vein.

Manganese associated as faint dissemination in volcanics and as a gangue in metal veins.

Barite occurs as a gangue mineral in some metal veins.

Chromite occurs as nodular masses in basic igneous rock.

COOS.

Limestone as in Douglas County.

Coal occurs near Coos Bay and elsewhere as sub-bituminous high in ash and volatiles in thick highly tilted beds.

Gold as in Tillamook county.

Copper and gold occur as lodes in the Rock Creek district.

Chromium as segregations and asbestos as veins in basic igneous rocks.

CURRY.

Gold, platinum, palladium and josephenite occur in streams and high bench rivers, gravels and in marine terraces in the Sixes, Port Orford, Ophir, Agness, Gold Beach and Chetco district.

Beach placers along the Oregon Coast were richly productive for a time after their discovery in 1852 and have since yielded small amounts of gold and platinum annually. Renewed interest in them was caused by the industrial depression that followed 1929.

The generally mountainous Oregon Coast is bordered in places by coastal plains that range from a quarter of a mile to four miles in width and are mostly less than 100 feet in height. The plains are of two different geomorphic types. One consists of lowlands composed of baymouth bars or barrier beaches and the filled embayment behind them; the other is a group of slightly elevated marine terraces.

In addition to these terraces a remarkable series of marine benches, the results of Pleistocene submergence, appear at intervals between sea level and 1500 feet.

Around many of the capes and headlands the wave cut bench is generally swept bare of debris by the waves, and stretches that are nearly always devoid of any noteworthy beach deposit aggregate about fifty miles in length. On the other hand, reentrants in the retreating shores are generally bordered by transitory beaches 50 to 200 feet or more in width, and such stretches aggregate 100 miles in length. Along certain other stretches the retreat has ceased for the time being and the shore has readvanced by the wave added beach material constituting a back-shore deposit. Such a retrograded and prograded shoreline aggregates 12 miles or more in length and the maximum advance has been 1000 feet.

Along the remainder of the Oregon Coast the shore has advanced from a quarter of a mile to two miles or more from its original position, as the result of wave built barrier beaches, bay mouth bars, and spits. All of the prograded stretches are characterized by a simple shore line and a voluminous beach deposit.

The distribution and height of the islands, the character and profile of the submarine bench and other features shown by the charts of the Coast and Geodetic Survey indicate a shore recession ranging from a quarter of a mile to four miles and averaging at least a mile. The prograded shores have advanced as much as three or four miles in places but the net result of the shore movements is apparently a loss of land area.

The different terraces are capped with Pleistocene marine sediments, the largest area of which is between Port Orford and Cape Arago and is related to an ancient shore line at an elevation of 170 feet. Beds formed offshore compose a terrace plain about South Slough that is somewhat lower, and there are remnants of beaches in some of the other terraces.

The placer deposits are wave concentrated layers in the beaches and offshore beds and are generally called black sands for the reason that they are composed largely of magnetite, chromite, and other heavy minerals most of which are dark colored. Commonly these layers contain small patches of sand in which are found particles of gold and platinum, and in places the metallic particles are abundant enough to be extracted profitably. In the beaches that are retreating under wave attack the deposits are variable and inconstant, but certain beaches are likely to be richer and more workable than others. The backshore of the present beach and the ancient beach at an altitude of about a hundred and seventy feet have been the most productive. The pay streak generally ranges from a few feet to 200 or 300 feet in width, is 3 or 4 feet thick in the middle and tapers toward the edges. It consists largely of alternating layers of black and gray sand with more or less cobbles, boulders and driftwood, and in the ancient beach is mostly covered with a barren sand overburden 20 to 60 feet thick.

The immediate sources of the beach minerals including gold and platinum are the shores that are being cut back by the waves. Most of the gold bearing beaches are south of Coos Bay along the coast opposite the Klamath Mountain region which bears several areas of gold bearing lodes. The lodes of the interior were the ultimate sources of the gold from which it has been carried seaward since early Tertiary time. As a result of stream sorting only the finer particles reached the coast. No definite source of the platinum has been found but its distribution and association with chromite suggest the abundant serpentinous and other basic intrusives of the region.

Owing to the transitory character of the foreshores of the present beach no definite estimate of reserves can be made but it is concluded that deposits suitable for small scale operators will continue to form here and there along certain parts of the coast. Ordinarily these deposits may be expected, under working conditions possible, to yield from a few cents to $2 per day per man. In places the backshore contains noteworthy amounts of gold and platinum, but in the decade immediately preceding 1932 attempts to mine the deposits apparently met with no success and no basis for an estimate of their value exists.

Parts of the ancient beach at 170 feet above sea level remaining between stream valleys aggregate 8 or 10 miles in length and contain pay streaks 50 to 100 feet wide and a few inches to several feet thick. These pay streaks are generally covered with 20 to 60 feet of barren sand and in most places their richer parts have been mined. How much ofthe remainder can be profitably worked under given conditions remains to be determined by prospecting. Black sand layers occur also in ancient offshore beds and in places at least contain a little gold and platinum. The "black sand" beds may be regarded as a possible future reserve of chromite and other minerals in case of emergency.

Silver occurs in the Port Orford and Elk River district in veins; copper in the Agness, Collier Creek district in veins. Iron occurs as a laterate at Collier. Copper and molybdenum occur in the Gold Beach district. Mercury occurs associated with later volcanics. Chromite occurs as segregation in basic igneous rocks. Clay occurs in soils and as shales in Cretaceous rocks.

JOSEPHINE.

Greenback district: Northeast corner of Josephine County.

The deposits of this district were first worked about 1860, and it is known that the Grave Creek placers alone produced $20,000 in 1883. Placers have been in operation along Graves Creek for more than 50 years and this gulch has been one of the most productive placer grounds in the state. It was estimated in 1912 that at least $400,000 had been taken from Grave Creek. The Greenback Mine is the main producer for this region. Its production was second in the state during 1904. It has not produced since 1910. The sporadic production from the area now is largely from small placer and pocket operations.

The Martha and the Greenback mines were the most productive of the deep mines in the district.

The rocks are either shales and argillites of the Galice (Jurassic) formation or are greenstones and serpentines altered from igneous rocks mostly auganites and andesites. Most of the mines occur in the Greenstone .

The mineral resources of the Greenback district are not diversified but the metal mines have yielded a large production. The district contains both placer deposits and metalliferous deep mines.

Galice district: Northwest corner of Josephine County.

The Almeda mine is the best known mine in the district. It has produced $23,580 worth of metals. Gold placer deposits and gold and copper vein deposits have produced about $5,000,000 in gold alone; only in recent years has the output of vein deposits exceeded that from placers.

Aside from small deposits of stream gravels the rocks of the area are either Jurassic sediments (Galice) and Dothan or igneous intrusives (possibly with some extrusives). The general strike of the sediments and also of the contact between the sediments and igneous rocks is about north 20° east. The sediments dip steeply to the eastward, but are overturned so that the strata to the west are younger than those near Galice.

Grants Pass District:

Placer gold occurs in the gravels of Rogue River and of Picket Creek. The first serious efforts to mine was the Jewell mine in 1863. In 1891 the Flanagan mine on Pickett Creek produced $18,500. In 1909 the Swastika placer mine produced about $10,000. Most of the output of the Grants Pass district during recent years has come from workings along Jump Off Joe Creek.

Of the lode mines, the Granite Hill located 9 miles northeast of Grants Pass and the Daisy Mine at the head of Jack Creek are the most productive. They have produced $75,000 and $200,000 respectively.

Lower Applegate District:

The drainage of the Applegate river contains placers that have operated for many years and lode mines of copper, gold, silver and chromium.

The rocks of the lower Applegate district include argillites, sandstones, quartzites, limestones, marbles, greenstones, serpentine, and tonalite as well as alluvial deposits. The oldest rocks are the usual Paleozoic sediments. The next younger series consists of argillites and sandstones of Jurassic period. The only later rocks are Recent alluvial deposits.

The mineral resources of the lower Applegate district include building stone, marble, limestone, shale, chromium, iron, copper, silver and gold.

Waldo district:

The Waldo district located south of Kerby and the Lower Applegate district and east of the west fork of the Illinois River.

In the spring of 1853 a stampede to Althouse Creek occurred. At about the same time sailors are said to have abandoned a ship on the coast and travelled overland to "Sailor's Diggings" where a ditch costing $75,000 is said to have paid for itself in one year. Work in the gravel at Scotts Gulch near Waldo began in 1861 and continued for about 35 years. The chief mining activity in this district has been placers ever since mining began and unlike other districts in southern Oregon, these gravel deposits are still productive and have some promise.

The Waldo district is occupied chiefly by old sedimentary rocks including argillites, quartzites and limestones, and by dark colored subsiliceous igneous rocks including andesite, serpentine, auganite, pyroxenite and others.

Lode deposits include chromium, iron, manganese, gold, silver, and copper. In general these deposits are not accessible being 35 to 50 miles from mass transportation. Gold placers in addition to the above occur in the Illinois River, China Diggings, and Mule Creek districts. Chromite occurs widespread as segregations in the basic igneous rocks. Limestone occurs as beds and lenses in the Paleozoic formation and some as at Grants Pass are of very large size, others are small and located a long distance from transportation. Manganese and rarely galena and cobalt occur associated with some of the metal veins. Graphitic schists occur.

JACKSON.

The county is located on the border between the intrusive igneous mass of the Siskiyou Batholith and the Cretacious and Tertiary sediments that dip to the northeast under Bear Creek Valley. The oldest rocks of the district are the amphibolites and quartz mica schists that are found along Wagner Creek. East of Wagner Creek are some sandstone, argillite, and limestone beds of Paleozoic age. The next younger series of rocks consists of the Siskiyou Batholith in its various phases.

Following the intrusion of the batholith came a long period of erosion following which time the Cretaceous deposits of Bear Creek Valley were laid down. Tertiary volcanics - ash and tuff were deposited on top of the Cretaceous. These sediments were then tilted 10-25 degrees northeast and covered with later lavas. These lavas are basalt, andesite, and rhyolite. Since the extrusion of the lavas, erosion and stream deposition has been the order. Bear Creek Valley is consequent to the lava flows.

Ashland District:

Ashland district is located near the town of Ashland 12 miles north of the California line. The important mines are on a ridge a few miles west of Ashland and also on Wagner and Sampson Creeks.

Mining in the Ashland district began in 1858 in the '49 Diggings. Lode mines were opened about 1880. The chief producer was the Ashland mine which produced about $150,000 from 1892 to 1899.

The gold-quartz mines are the most numerous and include such mines as The Ashland, Mattern, Redder, Shorty Hope, and Burdic. The ore consists of free milling gold in a gangue usually of quartz. None of the lode mines of this district are big producers although some promise was shown on the Ashland property.

Copper, lead, zincs are obtained from a sphalerite quartz mine 3 miles north of Soda Springs on Sampson Creek. The veins contain quartz, sulfides of iron and zinc with occasional stibnite and realgar. Molybdenite is found in a limited quantity in the aplite dikes south of Ashland.

Upper Applegate District:

The Upper Applegate including all of Jackson County that is drained by the Applegate River. Most of the production of this area has been in placer gold. Since 1903 the placers have declined, and no large quartz vein mines have as yet taken their place in this district. The rocks of the county are similar to those of Josephine County.

Antimony occurs near Watkins and on Forest Creek - NE$\frac{1}{4}$ Sec. 35, T.40 S. R. 4 W. An adit exposes stibnite and cervantite. Copper in small copper prospects occurs on Bear Gulch and near Sterling Ditch. Ore minerals are chiefly chalcopyrite and pyrite.

Gold and silver occur in placers. The Sterling mine is located on Sterling Creek 1 to 4 miles above its mouth. Value of gravels was about 40¢ to the cu.yd.; total production from these grounds is more than $3,000,000. There are also good placers on Forest Creek and values as high as $7000 to the acre have been recovered. There are numerous lode mines in this district, most of which have no production records. The Steamboat pocket, mined out before 1869, is said to have produced more than $350,000 from shallow surface workings.

Jacksonville District:

Jacksonville district is located in Bear Creek Valley between Phoenix and Central Point.

The chief placer deposit is along Jackson Creek including both forks of the creek near the town of Jacksonville. The gold quartz veins of the district are along the west fork of Jackson Creek within three or four miles of Jacksonville. The Opp mine about 1½ miles west of Jacksonville has a production record of about $100,000.

Gold Hill District:

Gold Hill district includes the whole Rogue River Valley from Central Point and Table Rock westward to Josephine County. It contains many mining districts organized during the years from 1853 to 1884. The rich pocket from which the town of Gold Hill takes its name was discovered in January, 1859. $400,000 was taken from this pocket during the first year. The placer mines have been producing for a long period of time but their production has been steadily falling off and no lode mines are found that are capable of maintaining the production this district has enjoyed in the past.

Cinnabar has been reported from the SE¼ Sec. 36 T. 34 S., R. 3 W., and on the south side of Evans Creek in Sec. 19, T. 34 S., R. 2 W.

Iron and copper have been reported from this district but no production is recorded.

Most of the gold produced from this district has been from placers. These placers are all closely associated with the present streams being either in the present stream beds or on terraces many feet above them. A few of the placers have been worked with dredges, but hydraulic mining has been the prevalent method. The placers are located on Kane, Sams, Sardine, Galls, Foots, and Evans Creeks and on Swacker Flat. Smaller placers are widely scattered over the area. Large placers are not located on the Rogue because of the narrowness of the channel which in most places is of gorge-like proportions. The auriferous quartz mines of the district are chiefly of the "pocket" type consisting of secondary enriched quartz pyrite veins from which a large part of the pyrite has been leached leaving the gold. The "pocket" near Gold Hill produced a total of $700,000. The Braden mine about two miles south of Gold Hill produced about $30,000 during 1907.

High volatile and ashy sub-bituminous coal beds occur in Tertiary beds of Bean Creek Valley and east of Medford.

General:

Saline waters near Ashland contain iodine and lithium chlorides.

Granite of the Ashland batholith is deeply weathered and its arkosic is used for road dressing; some has been ground for building use.

Limestone occurs in the Paleozoic rocks as lenses and beds, standing at high angles in many places.

Graphite schists occur.

Clay of the common type occurs in many places either below coals, as rocks or as alteration of rhyolite tuffs.

Asbestos in veins and chromite as segregations occur in many places in basic igneous rocks.

Asphaltic and oil shales occur east of Ashland and elsewhere.

Antimony occurs as small fissure veins and also associated with other metals.

WASCO.

Gold occurs sparsely in bench gravels.

Chromite and copper reported but of doubtful occurrence.

SHERMAN.

Diatomite occurs in Pleistocene lake beds.

Silver reported but of doubtful occurrence.

GILLIAM.

Limestone reported but of doubtful occurrence.

MORROW.

Limestone reported but of doubtful occurrence.

Coal high in ash and thin beds of lignite occur in Eocene beds.

UMATILLA.

Clay, occurs as alluvium.

Gold occurs sparsely in terrace gravels.

Iron reported but of doubtful occurrence.

WHEELER.

Diatomite occurs as in Sherman County.

Coal occurs as in Morrow County.

Gold occurs in terrace gravels in Spanish Gulch and in the John Day district.

Silica in small quartz veins and as diatomite.

Asphalt occurs as fillings in rare geodes.

Chromite, mica and iron reported but of doubtful occurrence.

JEFFERSON.

Copper, gold, silver, in complex ores in the Ashwood district.

Mercury occurs in the Ashwood district.

CROOK.

Mercury occurs in the Ochoco district associated with Eocene volcanics.

Gold and mercury occur in the Bear Creek Butte district.

Coal occurs as thin impure lignites in Eocene beds.

Diatomite occurs in Pleistocene lake beds.

Asbestos, brittle, occurs in small veins.

Limestone, very siliceous, occurs in Paleozoic rocks.

DESCHUTES.

Diatomite occurs in Pleistocene lake beds.

Salines occur in desiccated lake beds.

Clays from decayed lavas are present.

KLAMATH.

Diatomite occurs in Pleistocene lake beds.

Volcanic cinders are quarried for railroad ballast.

Gold and chromite reported but of doubtful occurrence.

LAKE.

Gold occurs in quartz veins in New Pine Creek and Coyote Hills district.

Diatomite and borax occur in Pleistocene and Recent lake beds.

Mercury occurs in association with young volcanoes.

Limestone reported but of doubtful occurrence.

HARNEY.

Gold and copper occur in quartz veins in Harney and Pueblo districts.

Mercury as in Lake County.

Saline and diatomite occur in desiccated Pleistocene lake beds.

Asbestos occurs in shear zones of basic igneous rock.

Limestone, gypsum, salt, bromine, graphite reported but of doubtful occurrence.

MALHEUR.

Gold, copper, silver, quartz veins in the old rocks at the south end of the county.

Mercury, asbestos, salines occur as in Harney County.

Diatomite occurs in Tertiary lake beds.

GRANT, BAKER, UNION, WALLOWA.

General:

Gold deposits of the Blue Mountains are distributed over a belt about 100 by 40 miles extending from the Snake River to Canyon City, comprising Carboniferous argillites, Triassic slates and greenstones, pre-Jurassic gabbros and in quartz diorites of post-Jurassic age.

The deposits occur chiefly as veins fillings both simple and composite. Their general strike is to the northeast near Bald Mountain batholith; more northerly in the Wallowa Mountains; elsewhere they do not appear to be so systematically arranged.

The dominant wall rock alteration has been sericitization in the feldspathic rocks, silicification and pyritization in the argillites. Replacement of the walls by vein material is shown by many phantoms of wall rock in the earliest quartz.

Mineralogically the veins are characterized by a quartz gangue with subordinate calcite, dolomite, and fuchsite. Metallic minerals are pyrite, arsenopyrite, sphalerite, chalcopyrite, tetrahedrite, and galena, and locally, hessite, bornite, argentite, stibnite, pyrargyrite, sylvanite and freibergite.

The sequence of deposition of minerals is generally barren quartz, pyrite, arsenopyrite, sphalerite, chalcopyrite, tetrahedrite, galena, The early quartz and in some cases the earliest pyrite in the composite veins are brecciated and the openings filled with later generations of the same minerals and the other sulfides. In the larger veins the workable ore is commonly confined to youngest parts of the veins.

Primary zoning about the Bald Mountain batholith is marked by the changes in the proportions of the sulfides to gangue and in the ratio of free to base gold rather than by changes in the variety of minerals. The inner zone is characterized by a large ratio of sulfides to quartz and a low ratio of free to total gold, while the other successive zones have less sulfides and more free gold. The average grain of the sulfides also decreases outward from the intrusive center.

GRANT.

Gold and mercury occur in the Canyon district; gold and silver in the Grant district; gold, copper, silver and antimony occur in the New Eldorado district; gold, copper and cobalt occur in the Quartzburg district, and gold, silver, lead and copper occur in the Susanville district. All of these occur as complex sulphides in lodes associated with pyrite and quartz. Gold also occurs in terrace gravels along many of the streams.

Limestone occurs in Mesozoic marine formations.

BAKER.

Gold occurs in Baker, Cornucopia, Cracker Creek, Rock Creek, Mormon Basin, Sparta and Sumpter districts as quartz veins.

Gold and silver occur in the Cable Cove district.

Gold, silver, and copper occur in the Conner Creek district.

Gold and copper occur in the Eagle Creek district.

Gold, silver, and mercury occur in the Greenhorn district.

Gold, copper and silver occur in the Homestead district.

Gold and tungsten occur in the Virtue and Weatherly districts.

All of the above occur in lodes with sulphides, quartz, pyrite, etc. as veins.

Cobalt and galena occur in some of the above associations.

Gypsum occurs on the Snake River near Homestead.

Limestone occurs at many localities, highly faulted and folded in Paleozoic rocks.

Coal occurs in small lignitic beds in Tertiary rocks.

Chromite occurs at many places as segregations as in basic igneous rock.

Clay and diatomite occur in Tertiary lake beds.

Placer gold occurs in terrace gravels.

UNION.

Gold occurs in quartz veins at Camp Carson.

Diatomite occurs as in Baker County.

WALLOWA.

Gold, copper, lead, silver, and chromite and diatomite, limestones, molybdenum, occur as in Baker County.

WHERE TO HUNT FOR MINERALS.

The list of mineral occurrences as recorded by Oregon Bureau of Mines and Geology, Vol. 2, no. 4, Dec. 1916, covers 306 pages of fine print and yet the list of operating mineral producers given in this book by A. M. Swartley is meagre indeed. The answer to this anomalous situation is not hard to find. None of these lists are anything more than lists; they offer no sound basic principles upon which exploration and research may be conducted. This is not a criticism of the above publication because they cannot publish information that does not exist.

Man has been a miner since the Stone Age. Mining is the oldest of man's occupations. In this long span of time many principles of Nature's way of hiding minerals in the earth have been discovered by toilsome digging. These principles, so arduously learned, have been carefully recorded. To learn them a man must spend most of a life time in intelligent study. To assist the miner, the chemist, physicist, geologist, biologist and many other scientists have researched into the laws of Nature. Some laws have been discovered. The laws of Nature and the empirical discoveries of the miner combined must all be at the command of the man who searches for minerals, hidden below the surface, in Oregon. In addition he must be a worker; mountains cannot be climbed, creeks waded for miles, and soil and brush removed from bed rock by sitting in an office nor by promotions of companies nor even by writing articles of this sort.

It is evident from what has just been said that if I were to treat this subject properly, I should be writing several volumes and not a short chapter in a book. Hence what is said below can only be a general statement of some of the facts which explorers for minerals in Oregon must know before they begin to search.

Igneous rocks contain small amounts of all elements found in ore deposits and it has become rather definitely established that metallic mineral deposits are genetically related to igneous activity, particularly that igneous activity that proceeds at considerable depths below the surface of the earth since it is here that are found the conditions for concentrating the valuable elements from widely disseminated ore minerals to economic deposits.

Large bodies of liquid rock have been formed at various intervals in geologic time at great depths in the earth and have eaten their way upward, gradually cooling as they progressed into the upper layers of the earth. During the cooling and solidifying process some of the metallic elements that are of economic value to man remain mobile longer than other constituents which progressively crystallize out as definite minerals. ore Other metallic ore minerals crystallize early. These early crystallizing minerals being heavier than the solution from which they crystallized sink and may accumulate in large masses to form ore bodies of considerable importance, within the body of the intrusive rock. Such ore bodies include iron ores, chrome ores, nickel and cobalt ores.

The remaining metals are kept in solution until most of the remaining materials have crystallized. The metals thus kept in solution include gold, tin, tungsten, copper, arsenic, silver, and mercury.

After crystallization of most of the magma, crack and fissures develop in the solidified portions due to changes in volume of the mass in passing from liquid to solid. Cracks and joints exist or are developed in the rock surrounding the intrusive body due to changes in temperature and forces of the intrusion causing deformation. The residual liquid from the crystallizing magma being under pressure is injected into the fissures in the solidified part of the intrusive and into the surrounding country rock. The greater the time allowed for the cooling of the magma the more completely the metallic elements are concentrated in the residual liquors and the larger and more valuable the ore deposits resulting.

On the map the solid black represents areas of coarse grained "granitic" rock which consolidated at considerable depth below the surface of the earth and have since been revealed by removal of the covering rock. Within these rocks will be found ore deposits resulting from accumulations of sinking crystals of ore minerals. Surrounding these plutonic rocks are those rocks that were intruded by the magma and into which the residual liquors from the cooling and crystallizing magma were injected to form veins and fissures classed as ore bodies.

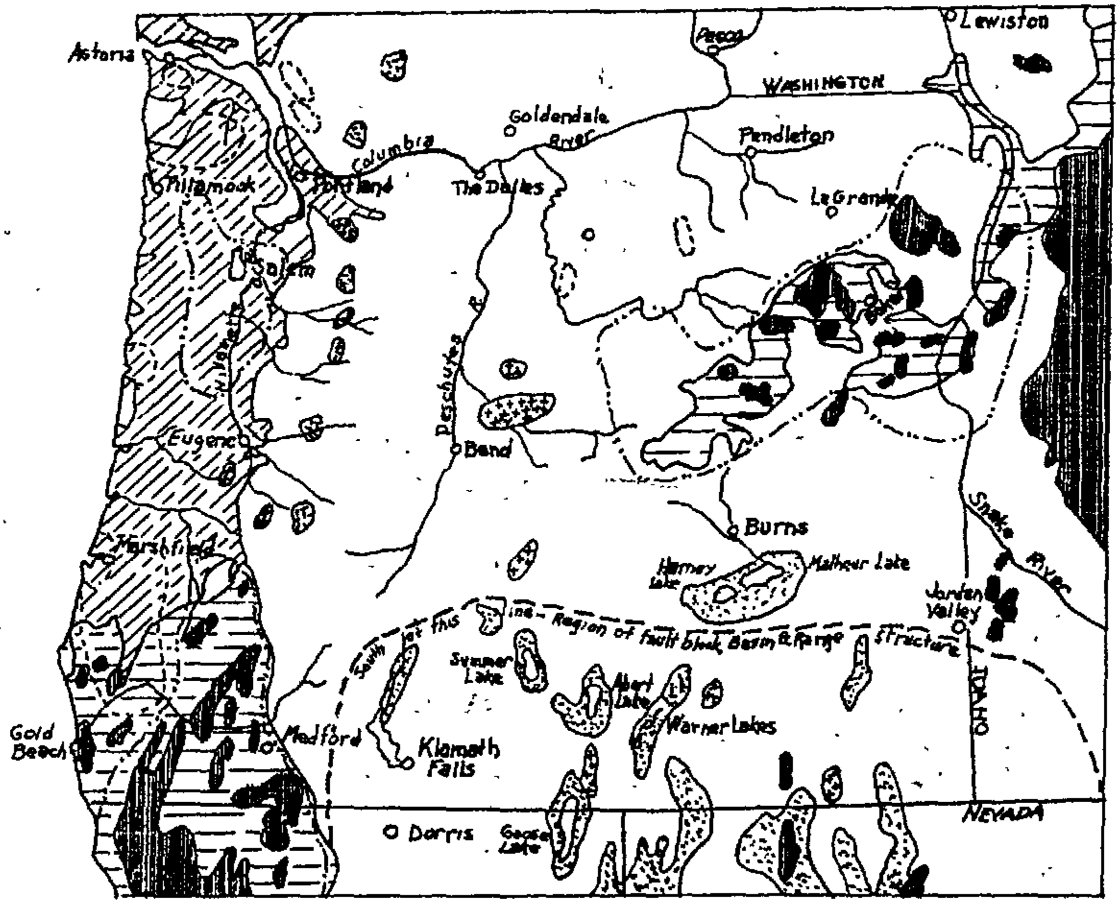
Along the Cascade Range there are exposed a few intrusive plugs much younger in age than the intrusive rock of the northeastern and southwestern parts of the State. These are shown by short lines. Some mineralization is to be expected and actually occurs in the vicinity of these plugs, but due to their smaller size, consolidation near the surface and consequent more rapid cooling, the segregation of the valuable constituents did not progress to the extent observed in the older intrusions that solidified at greater depths. Consequently the mineral bodies associated with these plugs are likely to be small and lack persistence to depths.

In other areas indicated by a cross there are mineralized complexes near which no intrusive rocks are observed. However, from observation of the relationship between ore deposits and intrusive rocks it is reasonable to assume that these mineralized complexes are related to intrusive plugs that did not reach the surface and have not yet been exposed by erosion.

In the mineralized complexes in the young cover rocks cinnabar is the predominating ore, though other ores may occur. Cinnabar is a mineral formed typically under low temperatures and pressure conditions and consequently usually occurs near the surface and does not extend to great depth. Such deposits may be genetically connected with intrusive bodies lying at some depth below the surface of the earth.

Areas in which limestones occur are indicated by a dashed and dotted line. In these areas at various times in the geologic past calcium carbonate was deposited from the seas that covered the area.

Calcium carbonate was deposited as a direct chemical precipitate or through the agency of calcium carbonate secreting organism such as corals, bryozoans and foraminifera.



ECONOMIC MINERAL AREAS OF OREGON

Scale of Miles

0 10 20 40 60 80

- Early Intrusives
- Old rocks affected by early intrusives
- Late Intrusive plugs
- Mineralized complexes in younger cover rocks
- Lava flows & volcanic ejecta cover rocks
- Sedimentary cover rocks (mostly marine)
- Areas in which limestone occurs
- Areas in which coal occurs
- Areas in which salines occur

Limestone areas in which intrusive bodies occur are very favorable locations for ore deposits since the mineralizing solutions from the intrusive react chemically with the limestone. Large ore bodies frequently occur at the contacts of the limestone and intrusive as a result of the replacement of the limestone by the ore bearing solutions. The limestones are also very valuable in agriculture, cement, lime rock and for other uses.

Most of the State is covered by young rocks of either sedimentary or volcanic origin. What lies under these young cover rocks is conjectural. The mineral deposits associated with these rocks include coal, cinnabar, salines, and some limestone.

Coal occurs in greatest volume in the marine sedimentary rocks along the northwest and west central parts of the State. The deposits result from accumulation of organic (largely vegetable) material in swampy areas near tide level.

Lying on top of the lavas in the southeastern part of the State are areas in which saline deposits may occur. These areas are stippled on the map plate.

It is generally held that saline deposits result from evaporation of undrained lakes in arid regions. Water flowing into the lakes carries materials in solution. If the lake is undrained and the lake level is maintained by evaporation there results a concentration of the dissolved substance in the lake water due to continued addition by streams until supersaturation and precipitation occur. The lakes in southeastern Oregon were probably much larger in the past than they are now. The water has been evaporated but the dissolved salts still remain in the old lake beds. These deposits may include salt, borax, potassium, and sodium carbonates and nitrates, and sodium sulphate.

In Nevada and parts of eastern California portions of the earth's crust have been fractured and the broken blocks tilted upward to form mountains. As a result, older mineral-bearing rock has been brought to the surface. This is important in an area where lava and lake beds would normally cover the surface and hide whatever mineral might be below.

Consequently the extension of this fault block area into southern Oregon is shown on the map.

ORIGIN OF OREGON'S MINERAL DEPOSITS

IN BODIES OF IGNEOUS ROCK.

Deep-seated Intrusives.

Non-Segregated:

Monumental stone near Prairie City and Ashland.

Segregated:

Platinum - segregated from serpentine and pyroxenite, and other basic rocks in very small amounts (such as precious metals, weathered from such rocks, are found now in beach placers in Coos and Curry Counties, also in Waldo district in Josephine County)..

Chromite: found in the Blue Mountains - John Day area in Grant County between Prairie and Dayville - also on Granite Creek - small deposits on Connor Creek in eastern Baker County. This chromite occurs in small lenses in serpentine. The serpentine was originally a rock between saxonite and dunite. Chromite averages 30-40% Cr_2O_3 - as high as 50% occasionally.
Also found in Klamath Mountains as segregations from pyroxenites which have been altered to serpentines.

Lava Flows:
Trap rock, mined on a large scale for road metal, construction and other uses in nearly every county in the State.
Some copper has been found in basaltic lavas.

Volcanoes:
Cinders are quarried from Bend to Klamath Falls from volcanoes.

Pegmatite Veins.

Coarsely crystalline igneous vein-dikes containing quartz, feldspar and mica are very rare in Oregon. A few large pegmatite quartz veins are known, one near Hugo near Grants Pass and in the Wallowa Mountains.

Igneous Vein Deposits.

High temperature and pressure veins and shear lodes.
Gold - quartz veins of the Blue Mountains "gold belt".
Magnetite veins near Grants Pass and in the Snake River area.
Very old rocks, older than the Cambrian, are not certainly known in Oregon, consequently the above types of deposits which are found mainly in such rocks are rare in Oregon.
Paleozoic, and to a large extent the Mesozoic, rocks occur as islands standing above the general level of Tertiary volcanics, lake beds and marine formation which cover most of the State.
Moderate Temperature and pressure veins:
The moderate temperature veins occur mainly in older rocks and are to be found generally only in these "islands".
Gold: Blue Mountain District. This district extends from the Snake River to Canyon City. Veins contained in Carboniferous and Triassic states and argillites and gabbroitic intrusives. Deposits and veins of filling containing quartz gangue with mica (fuchsite), calcite and dolomite. Metallic minerals and principally pyrite, arsenopyrite, sphalerite, chalcopyrite, galena, tetrahedrite, and occasionally gold, bessite, bornite, argentite, stibnite, pyrargyrite, sylvanite and freibergite.
Copper: chalcopyrite, pyrrhotite veins of southewestern Oregon.
Pyritic Replacements: Seven Devils district of Idaho continuous into Oregon.
Cobalt: veins of southwestern and northeastern Oregon.
Low Temperature and pressure veins:
The veins of low temperature and pressure are formed closed to the surface and are found in rocks that were not deeply buried when the mineralization took place. Consequently most of the mineral lodes of Oregon occur in such rocks.
Complex sulphides of copper, lead, zinc, gold, and silver.

A chain of epithermal base metal deposits extending from near the California line to the Columbia River as in the Bohemia district.

Gold: chief product. Silver, copper, and lead also produced. A chain of mineralized areas extends from the California line to a point north of the Columbia River in the Cascade Mountains of Oregon. In the Bohemia district the mineralization chiefly occurs in a series of interbedded andesitic tuffs, andesites, and rhyolites, which have been intruded by dikes and stocks of granodiorite, diorite, porphyry, and dacite porphyry. Halos of metamorphosed rock, variously characterized by tourmaline, cherty quartz, epidote, specularite, chlorite, and magnetite veinlets occur with some of the intrusive masses.

Most of the veins are characterized by brecciated country rock cemented with vuggy comb quartz. The primary alteration of the country rock is mainly silicification and sericitization. Weathering has produced kaolinite and beidellite.

The most typical veins are those containing sphalerite, galena, chalcopyrite, and pyrite, which occur in lenticular shoots in the quartz-cemented breccia. A little tetrahedrite is occasionally found associated with the chalcopyrite. Some veins contain in different proportions calcite, calciferous rhodonite, specularite, adularia, barite, and a few veins contain quartz and calcite and free gold. The gold content of the complex sulfide veins is generally low and silver predominates over gold about five to one by weight.

Direct Igneous Emanations

Subsurface.

Quicksilver: In Oregon quicksilver has been produced in a number of places along the foothills of the Cascades in Douglas and Jackson counties, also east of Prineville, Crook County, and close to the southern boundary of Malheur County. Black Butte in Lane County has been a steady producer for a number of years.

In Douglas and Jackson counties most of the deposits are enclosed in Eocene sandstone and tuffaceous strata, related to but not closely restricted to faults. Locally a superincumbent impermeable layer has evidently aided concentration. The cinnabar is generally associated with little other introduced material, but pyrite, marcasite, calcite and other carbonates, chert and quartz occur. The wall rocks show replacement by sericite and fine grained silica, or quartz and beidellite, or locally by fine grained quartz and carbonates. No bituminous matter is known.

In Crook County and adjacent parts of Wheeler County the deposits are in Tertiary lavas. Some of the lodes are rather sharply defined veins; others are networks of seams in brecciated rock. The lode minerals are cinnabar, pyrite, quartz, chalcedony, opal, calcite, clay minerals, and small amounts of an asphalt-like hydrocarbon. The wall rocks are altered to clay minerals with some silification.

In Malheur County the Opalite mine is an intermittent producer. The lode consists of silicified Tertiary tuff with cinnabar and terlinguite. Development shows the ore body is approximately 150 feed wide by 350 feet long and does not extend over 50 feet below the surface.

Antimony: (a) Baker County - stibnite near Baker in the Palmer district.
(b) Curry County - stibnite vein at Eckley.
(c) Jackson County - stibnite with silver and gold on Applegate river near Watkins. Also 20 miles south of Jacksonville.

Manganese: lower epithermal hausmanite deposits derived from manganous facies in chert beds. It is associated with lava flows in the southwestern part of the State.

Surface Deposits.

Sublimates of sulfur and mercury from fumaroles on Mount Hood and older extinct fumaroles elsewhere.

HYDROTHERMAL DEPOSITS.

Hydrothermal effects are associated with all of the above mineralization. Asbestos and talc of the southwestern and northwestern part of the State occur in basic rocks.
Clays - some of the clays of northwestern Oregon may be of this origin.

SPRINGS.

Calcareous tuffs and silicious sinter is found near various hot springs. Saline wells of the lower Willamette Valley and thermal springs in various parts of the State.

CHEMICAL CONCENTRATES.

Lakes and desiccated lakes of eastern Oregon contain calcium, magnesium, sodium and potassium chlorides, carbonates and sulfates and borates.

MECHANICAL CONCENTRATES.

Gravels and sands in many streams and terraces are mined extensively in all parts of the State.
Gold, platinum, palladium and chromite occur in stream beds, terraces and sea cliffs, especially in southwestern and northeastern and central Oregon.

BEDDED DEPOSITS (SEDIMENTARY).

Marine limestone occurs in the Paleozoic of southwestern and northwestern Oregon, in Mesozoic of north central and Oligocene rock in northwestern Oregon.
Gypsum occurs in small beds near Homestead, Oregon.

BEDDED DEPOSITS (SEDIMENTARY).

Diatomite occurs in Pleistocene lake beds of eastern Oregon.
Oil shales occur near Ashland.
Eocene coals, high in ash and volatiles, occur in western and north central Oregon.

SOILS AND LATERITES.

Lateritic and Bog Iron ores occur in Clatsop, Columbia, Clackamas and Washington counties.
Clay probably of lateritic origin occurs in northwestern Oregon.
Nickel occurs as a laterite derived from saxonite on Nickel Mountain.

METAMORPHIC DEPOSITS.

Graphitic schists occur in southwestern Oregon.
The map shows the intrusive rocks from which came the mineralizing solution, the intruded rocks which reacted with the intrusive rocks and formed favorable media in which the ores developed the fracture lines along the Cascades through which later igneous rock of mineralizing character came. The map indicates the areas in which prospecting for metallic ore should be most diligently prosecuted.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed

PORTLAN OREGO

~~Sec. 562, P. L. & R.~~

. Arthur C.
ather Lane
regon

Geological News Letter

Vol. 4 No. 9 | Portland, Oregon | May 10, 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * ANNOUNCEMENT *

Field Trips

Sunday May 15th : Leader, F. L. Davis
: Location: New Wolf Creek Highway to the sea.
Caravan leaves 8:00 a.m. sharp from starting place at SW6th ave. and SW Yamhill St. Those wishing to do so may join the caravan at the far side of Forest Grove at 8:30. Caravan will proceed via Gales Creek road to intersection of new Wolf Creek Highway with Timber-Vernonia road; thence along the Wolf Creek Highway to Bear Creek camp. A walk of one-half mile from that point is contemplated.
Mileage of road trip: 108 miles. If there should be sufficient rain to soften the road bed, the trip will not be permitted and a substitute trip will be arranged to Devils Rest in the Columbia Gorge, via Wahkeena Falls. Walking distance eight miles. Definite announcement will be made not later than the lecture on May 13th.

Week-end May 28,29, 30th : Decoration Day trip.
: Leave Portland Saturday, May 28, any time during the day, either individually or in groups.
Take Wapinitia Cut-off to Maupin, 103 miles.
Take Dalles-California Highway to junction 22 mi.
Turn left to Shaniko, 11 miles.
Leave main highway, turn square to right, to Antelope, 7 miles.
3 miles beyond Antelope, take left hand road to Clarno, 12 miles. Cross bridge, follow main road about 2 miles to oil derrick.
Turn to left, opposite derrick, follow dim road between small houses ½ mile up dry canyon to camp. Late Sunday p.m. break camp and move to west side of river to mammal beds about 2 miles down the river. Return home Monday afternoon.
What to take:
Food and water for two days.
Bedding for two nights, if camping out. Tourist accommodations at Fossil, 16 miles.
Take medium weight hammer, cold chisels, small trench pick and paper or sacks for wrapping specimens.

Sunday June 12th : Bull Run Dam
: Leader: B. S. Morrow.

Lectures

Friday May 13th : Dr. Ethel I. Sanborn, Professor of Botany, Oregon State College, who is a specialist in paleobotany, will discuss the proper methods to use when collecting paleobotanical specimens. Consideration will also be given to the necessary tools. Dr. Sanborn has gained widespread recognition for her work on the Goshen and Comstock flora, and subsequent studies.

Lectures (continued)

Friday May 27th : Mr. Earl K. Nixon, Director, State Department Geology and Mineral Industries, will give his impression of mining in the South American jungles.

New Members

O. E. Stanley, TA 1250,
2601 SE 49th Ave.
Portland, Oregon

Arthur H.Greisser, TR 4745,
3424 NE 30th Ave.
Portland, Oregon
Business address: Electric Bldg.

Paul Van Scoy,
Phone Salem 5648,
1000 Chemeketa St.
Salem, Oregon
Business address:
State Highway Dept.
Salem, Oregon

NEW LOCATION FOR THE THURSDAY LUNCHEON MEETING.

Beginning at 12:00 noon, May 19th, and every Thursday noon thereafter, the luncheon group will meet at

L'ABBE'S FRENCH DINNERS
910 S.W.Salmon Street
(Roosevelt Hotel)

Prices are 40¢ - 45¢ - 50¢ and up. You have your own choice.

The dining room is on the ground floor, with a full glass front that will give plenty of daylight for the examination of rock and mineral specimens.

As to the food - well, come out and try it. Tell your friends of the change, and remember the date.

This change is made as the result of a vote taken by a canvass of 27 regular attendants of the luncheon.

Thursday Noon Luncheon Morsels

April 7th:
Tracy Wade reported possible discounts in purchase of publications on geology by members of the Society.
Franklin Davis produced a method of testing intelligence. It was tried on the President, who showed some indications of intelligence.

April 14th:
Six ladies present.
Mrs. Stockwell displayed marine fossils from Lincoln County.
Bruce Schminky showed the only fossil chicken bone known to have been found west of the Cascades.
Mr. Leslie Richards, a guest, told of gold operations in Idaho during the winter, where supplies were brought in by dog team and aeroplane.
Mr. Orrin Stanley showed color pictures of his recent trip through Mexico.

REPORT OF SERVICE COMMITTEE.

The following bulletins of the Carnegie Institution of Washington relating to the Oregon Country are available to members a discount from list prices:

No.322B.	Hay, Oliver P. - The Pleistocene of the Western Region of North America and its vertebrated animals. 1927. 346 pp.	$2.50
No.390	Hay, Oliver P. - Second Bibliography and Catalogue of the Fossil Vertebrata of North America	
	Volume 1. 916 pp. 1929	7.50
	Volume 2. 1074 pp. 1930	8.00
No.346	Contributions to Paleontology. 1927. 159 pp.	3.00
	Contains: Merriam and Stock - A Hyaenarctid Bear from the Later Tertiary of the John Day Basin of Oregon.	
	Chaney, Ralph W. - The Geology and Paleontology of the Crooked River Basin with Special Reference to the Bridge Creek Flora.	
	Mason, Herbert L. - Fossil Records of Some West American Conifers.	
No.347	Contributions to Paleontology. 1925. 92 pp.	2.00
	Contains: Merriam, Stock and Moody - The Pliocene Rattlesnake Formation and Fauna of Eastern Oregon with Notes on the Geology of the Rattlesnake and Mascall Deposits.	
No. 349	Contributions to Paleontology. 1925. 130 pp.	3.00
	Contains: Chaney, Ralph W. - A comparative Study of the Bridge Creek Flora and the Modern Redwood Forest.	
	Chaney, Ralph W. - The Mascall Flora - Its Distribution and Climatic Relation.	
	Same - Notes on Two Fossil Hackberries from the Tertiary.	
	Same - A Record of the Presence of Umbellularia from the Tertiary.	
No.393	Contributions to Paleontology. 1928. 58 pp.	1.50
	Contains: Merriam and Gilmore - An Ichthyosaurian Reptile from the Marine Cretaceous of Oregon.	
	Maxson, John H. - Merychippus isonesus from the Later Tertiary of the Crooked River Basin.	
No.404	Contributions to Paleontology. 1930. 112 pp.	2.25
	Contains: Buwalda, John P. - A Neocene Erosion Surface in Central Oregon.	
	Buwalda & Moore: The Dalles and Hood River Formations, and the Columbia River Gorge.	
	Stock: Carnivora New to the Mascall Miocene Fauna of Eastern Oregon.	
No.416	Contributions to Paleontology 1933. 68 pp. cloth	2.50
	Contains: MacGinitie, Harry D. - The Trout Creek Flora of Southeastern Oregon.	
No.418	Contributions to Paleontology. 1932. 113 pp.	2.00
	Contains: Furlong, Eustacia L. - Distribution and Description of Skull Remains of the Pliocene Antelope Sphenophalos from the Northern Great Basin Province.	
	Gazin, C. L. - A Miocene Mammalian Fauna from Southeastern Oregon.	
	Packard, E.L.- A contribution to the Paleozoic Geology of Central Oregon.	

No.439	Contributions to Paleontology 1933. 103 pp. Chaney and Sanborn - The Goshen Flora of West Central Oregon.	$2.50
No.447	Contributions to Paleontology 1934. 136 pp. Contains: Packard, E.L.,- A New Cetothere from the Miocene Astoria Formation. Huber, Ernst - Anatomical Notes on Pinnipedia and Cretacea.	1.75
No.453	Contributions to Paleontology, 1935. 125 pp. Contains: Wilson, Robert W. - A New Species from the Pliocene of Eastern Oregon. Bode, Francis D. - Tooth Characters of Protohippine Horses. Scharf, David W. - A Miocene Mammalian Fauna from Sucker Creek, S. E. Oregon.	2.25
No.455	Contributions to Paleontology. 1936. 152 pp. Contains: Oliver Elizabeth - A Miocene Flora from the Blue Mountains. La Motte - Climatic Implications of Sapindis Oregonianus. Same: Some Systematic Revisions in Miocene Paleobotany.	2.75

Members wanting to purchase these or any others that have appeared in previous reports give a memorandum or mail a postcard to Tracy Wade, 4204 NE Broadway.

WALLOWA MOUNTAIN SUMMER CAMP MEETING.

Everyone who is interested in attending the camp at Wallowa Lake during the first two weeks of July, is requested to meet in the auditorium of the Public Service Building at 7:30 P.M. on May 13. This is the regular Society meeting night, so please be there early.

The purpose of this meeting is to fix the camp location. This camp need not be an expensive one, so if you are interested at all, come out and let us discuss the details.

This matter of camp location must be fixed this month, so that the committee can start planning the program for the time we are there.

Remember that the larger the group we have at the camp, the better the rates will be for each one.

THE GEOLOGICAL BOOK OF THE JOHN DAY COUNTRY.

A STORY OF ANCIENT JOHN DAY

A. W. Hancock

Rocks, like individuals, may be classified as good or bad, depending to some extent, on our immediate outlook or viewpoint. For example, let us say we have just been digging in our garden and inadvertently have spoiled the cutting edge of our hoe on a hidden quartzite or flint. Or perhaps we have returned from an otherwise pleasant trip in the country and found our new tires cut and torn as a result of a stretch of newly-surfaced road bed over which we have traveled. Under such circumstances our appraisal of rocks in general might be anything but flattering.

But on the other hand, if, without prejudice, we will take the trouble to balance the faults against the virtues, we will quickly find that the good points far outweigh the bad, and giving credit where credit is due, rocks readily take their rightful place among our most cherished and valued possessions, whether we wish to admit it or not. The truth remains that every material thing which influences our comfort, our security, our pleasures, our foods, our drinks, or even the clothes we wear, comes originally from the rocks. Or looking at the question from the mental standpoint, take for instance one who possesses a desire to improve his knowledge, to delve into the mysteries of the sciences; it matters not which road one chooses to travel, they all lead back to the rocks.

The poet tells us that "The proper study of mankind is man". But the tangled web of his past and his present is so interwoven with that of rocks that there is seemingly no place to draw the line.

Long before the date of written history we find ancient man chipping away at flints and cherts fashioning his weapons, his tools, his arts, in the great caverns in the side of cliffs which served as his home. Later we find him holding his councils of war or observing his religious rites under the protecting influence or the shade of some prominent landmark, - a huge stone. This particular achievement of his we have never quite outgrown for we find ourselves assembled here, this evening, in the shadow of a great rock for the purpose of discussing our current events. The great rock I refer to is the earth and night is but the shadow.

The major portion of the earth, as we know it, is made up of an almost endless variety of rocks. Some are beautiful, some useful, and some are economically valuable, but regret it as we may, lack of time prohibits discussion of any of these interesting stories for we must devote our entire attention to these few unpretentious fragments known as fossils.

At the very mention of fossils one's mind naturally reverts backward to horizons dim with age. Those who study such subjects are sometimes chided for living too much in the past while there is so much in the present that needs all our attention. My answer to such reasonings would be something of this order: that the present can never be properly understood without a fair knowledge of the past and to such knowledge, the fossil appears the only key.

Nature, the great historian, is day by day busily jotting down the sundry happenings, omitting nothing. But as she writes with one hand, she erases with the other and the rock patches we call fossil beds are places carelessly missed with the eraser or in the language of the geologist, erosion is suspended.

Nature began her history on the morning of time and has never throughout the ages for one brief moment ceased working. Her entire recordings are carefully bound and sealed in the so-called sedimentary or water-deposited rocks such as sandstones, limestone, and shales.

The geologist has formulated a term to which he constantly refers as the rock column. This column represents what would have been the maximum thickness of deposited rocks had deposition never been disturbed. A shaft driven through this great pile, would have reached the astounding depth of approximately 40 miles, presenting a problem far too large to be covered as a single subject. So for convenience of study he has systematically divided this column into numerous sections and applied an appropriate geological name to each. For the obvious reason of simplifying this story, we shall omit the geological terms wherever possible and refer to these sections as strata or books. And books they truly are: depicting in panoramic array the epic of the ages, history, drama, tragedy, as absorbing as the most profound fiction of today.

I am sure it is from the lack of understanding that the average person seems to shy from the study of rocks or geology. They seem to feel that the subject is too deep, too intricate for the novice, but such is far from the truth. Nature's recordings as a rule are far more simple and more easily understood than are the writings of man. But do not misunderstand me to say that all geology is so simple; many problems are so profound that the world's greatest intellects have not as yet plumbed their depths. Such problems may be passed on to the experts with minds trained for such purposes.

But there is so much commonplace geology at our very fingertips that we all may learn to read with the slightest effort and thus the world about us becomes many fold more interesting. In order to clarify the statement that nature's stories are simple, allow me to cite an imaginary situation as proof of my contention.

Let us say we are motoring through Central Oregon and we observe along each side of the highway, in the dry dust, great numbers of the footprints of sheep. These are closely followed by other foot prints, those of a man, a dog, and a horse. Even though we fail to see any of the objects which produced these impressions in the dust we can easily form a mental picture, approximately, as correct as a photograph itself of what has just transpired. Nature has written the story and from the evidence of the dust this is what we see: - A band of sheep, a herder, his dog, and his pack horse. The story is so simple thata child could read and understand it. A savage who knows no written language reads what is written here and interprets it correctly. Geology appears strikingly similar to this. One merely collects the fossil evidences, places them together in an orderly fashion, and the picture automatically unfolds. Yet there is a difference - the fossil record is much more permanent. A passing breeze may completely destroy the record of the dust. For millions of years nature plays her most destructive forces against the fossils with but slight damage. She causes great floods to pour overthem; she allows the ocean to move in to rage and billow for ages and then to withdraw again; the earth opens her internal furnaces pouring thousands of feet of molten lavas over them. Finally, erosional forces of wind, water, and frost remove these materials and our fossils are uncovered - still intact.

But an interested observer gazing out over an average landscape would see none of this. The fossil-bearing strata which we refer to as books lie buried hundreds of feet beneath the land surface. Now the problem arises just how shall we best present this picture to view? Nature has many very good solutions to offer but the most practical is that of a river.

Contrary to what many believe, rivers are not accidents. They do not just happen. They are where they are and what they are for very good reasons. Rivers must be built and to construct a river system many forces or agencies are required. For the sake of brevity, we shall dispense with all except the three most prominent - water, wind, and frost. These three we will personify - giving them the power of living, breathing, moving beings and put them to work to carve out a river for us which, when completed, we shall name the John Day.

Every drop of water that falls on the land surface of the globe has its own peculiar ambitions and that particular ambition is to find its level or to get back to the sea from whence it came at the earliest possible moment. This fact in itself, goes a long way toward explaining the causes of all rivers. Tho all rivers have a great deal in common, each has its own particular story to tell, more specifically, the one we have chosen to describe, the John Day

Without proceeding farther we shall at this time return to the rock column for the purpose of locating the true position of the geological division known as the Pliocene - the birthplace of the John Day river. We readily discover that this period occupies a place very near the top of the column, proving that the river is quite a young stream possibly no more than a few millions of years. This, of course, to the average person might seem tremendously old - but to the geologist it is only yesterday.

From this point onward we shall attempt to clothe known geological facts in raiments of fancy and fashion a story something like this: About the middle of the Pliocene period there gathers over the Pacific Ocean a great storm cloud, heavily laden with moisture. It moves inland, travelling eastward, until it comes in contact with the cool western surface of the Blue Mountains, causing the moisture to condense. It begins to fall in torrents. These millions of raindrops, true to their ambitions, immediately begin their long trek back to the sea. Following the course of least resistance they form little streamlets and head down hill uniting as they go. They soon find themselves in one immense aggregation all huddled together in the midst of a natural depression completely surrounded by highlands. Just what is now to be done? Long drawn out discussions will avail nothing. Rivers, we know, cannot run up hill. And rivers never go around the low country. There is but one thing that can be done and that is to build a bridge or a viaduct let us call it, across the depression so that water can pass over. Then we arrive at that old, old question: When is a lake not a lake? The answer is:

when it is a bridge. All lakes are bridges, ephemeral fleeting things made for that purpose only. These streamlets, then, became very busy bringing down rocks, mud, and silt to pile in the lowest places and at the same time pouring in immense quantities of water. The shorelines steadily move upward until the depression is completely filled and the overflow pours through the lowest gap. The bridge is now completed. The waters begin crossing over and once more are headed for the sea. Once more fate interrupts the plans, at least temporarily. The moving waters have not proceeded far when they find themselves again in the depths of another depression. The story is repeated not only once but many times for the geologists tell us that the John Day was originally a chain of shallow lakes. The course of the stream meanders here and there until it has filled all the lowlands and finally plunges over into the Columbia.

But the millions of raindrops which pass over remember those left behind and begin cutting away the obstructions and carve deep channels so as to liberate the impounded waters. This is done until not a drop of water remains imprisoned and not a lake exists on the entire length of the river.

This task has been tremendous and has taken untold years - time and hard labor. So now the stream is in a position to take life easily for awhile and is just leisurely rolling along - until one fine day the West Wind happens to be passing and takes note of the situation - she hesitates, stops, and whispers something to the lazy river. It is a secret, but I am going to let you in on it. The wind whispered this to the river, "Far, far down beneath these hills and the valley over which you are passing, lie buried many hidden treasures. Chief among these and most important, I might say, are some wonderful libraries of books profusely illustrated, written in a universal language, in a style and manner easily understood by anyone interested enough to read. They consist of biographies, histories, poems, romances - more entrancing than fiction, more startling than a magician's dream. In fact, it is the story of the unbroken thread called life, whose zig-zag trail leads backward through the dim and misty past to a time that no man knows. "And", said the West Wind, "these records are clear and legible and undoubtedly will still be millions of years after man-made annals have passed from the memory of men. They are as eternal as the hills and the beauty of it - they are true. They were written by a hand that had no pet theories to deny or defend - no creeds or 'isms to please. Events were chronicled precisely as they appeared. And," said the West Wind to the river, "they are yours if you are willing to work for them".

"Yes", said the river to the wind, "your story is indeed very interesting. But how am I to know it is true? How do you know it is true?"

The West Wind replied, "I am very, very old. I was here when the stories were written. I was here when they were buried."

The John Day believed the things it had heard and at once began working to deepen its channel. The news spread far and wide. Said the North Fork to the South Fork, "Let us help with the excavation!"

Canyon Creek, Bridge Creek and Rock Creek also volunteered a hand, saying "We will gather all the waters which fall on our vast domain and rush them down to your assistance."

Then up spoke Jack Frost who had been intently listening, "I, too, would love to assist. I will creep into the fractures of the rocks and pry them apart. I will upset the big boulders and roll them down so that you may carry them away."

"And", said the West Wind, "could on me, also, although I helped bury these wonders, I will also aid in uncovering them again. I shall swish in and out of the base of cliffs until they shall tumble down. Then I shall gather up the dust and transport it far over the hills and plains."

So it was agreed and, in perfect harmony, these forces began working. "But," cautioned the West Wind, "Because of the order in which these records were buried, we shall reach the latest book first. We, of necessity, will have to go through them backward, and judging from our present position, the first book we should reach will be known as 'The Upper Miocene'. The last chapter, of which, is a long and difficult one to master, but which is very thrilling and spectacular. It will contain a description of the famous Columbia River lava flows - perhaps the greatest outpourings of liquid lavas in the entire history of the earth. Some twenty-two distinct flows are here depicted. These successive flows in their respective districts destroyed everything in which there was a breath of life - over an empire of three hundred thousand square miles".

After ages and ages of tireless labor, the river cut its way through thousands of feet of hardened basalt reaching the second Chapter called the "Lower Miocene" or locally, we shall say, the "Mascal". Try to imagine the thrill when the first evidence of past life showed up in some fossilized twigs of the great redwood, some grasses, water reeds, palms, birches; and of animal life: small deer, rhinoceros, wild dogs, cats, and some forty species of the horse family - that kind, dependable animal to which man in his upward struggle from the jungle owes a greater debt of gratitude than to any other score of species that has yet lived.

reptiles

We also find numerous types of clumsy turtles, crocodiles, and other amphibians as we hurriedly examine these records.

Heretofore in our story, we have but lightly touched the high points knowing that space for details in a talk of this nature is quite impossible, but I wish to beg your tolerance for one brief moment while I attempt to bring to you an intimate close-up of just what was happening in this land of long ago.

The first red streamers of light are just beginning to feel their way across the eastern sky announcing the break of day. The whole vast forest is awakening to life. As the sun moves higher, the purplish-blue of the Blue Mountains is assuming a greyish cast. In the distance, the walnuts, hickory, and ash scattered among the mammoth redwoods give the effect of shadow-tracing on the landscape.

The call of the falcon, the screech of the hawk, the swish of the great eagles' wings can be plainly heard above the continuous whirr of clouds of semi-tropical insects.

Strange grape-like vines heavily laden with fruit, swing and sway like magical draperies from the topmost boughs of these forest giants, while ape-like primates playfully scamper among the branches.

But, hark! the noisy voices of the jungle have become silent, - stilled through fear; and, as we listen, from the darkening depth of the woodlands comes the answer. Not far distant a battle royal is raging. Perhaps it is only a pack of wild dogs fighting over the remains of some hapless horse or deer which has fallen victim to these fierce carnivores. As the natural routine of forest life becomes normal again another scene greets our vision. Just across from the little glade where we stand, a great sabre-tooth cat may be seen peacefully sunning himself on the fallen trunk of an ancient sycamore tree. Suddenly he rises to his feet, sniffs the air nervously - walks back and forth a few times - finally, settling to rest again at a point farthest from the ground. Elotherium, the terror of the mammal world, had just sauntered past; a swaggering beast whose right-of-way no living thing dared challenge.

Two does, a fawn, and camel-giraffe which were grazing nearby have scurried for cover under a grove of cinnamon trees. In the lowlands just below may be seen among the tall equistetum and swamp grasses several species of the rhinoceros with perfectly developed horns. Across the lagoon, underneath some overhanging palms, a mother mastadon and babe are disporting themselves in the shallow waters enjoying a shower bath of their own making while weird, grotesque miniature crocodiles swim listlessly about unmindful of it all.

Looking southward, past a jutting headland where the blue of the sky meets the blue of the sea, not a thing obstructs the vision. To the west, the horizon is broken by a jagged landscape - the old Cascades. From a dozen individual peaks intermittent puffs of smoke continuously arise - forming long trailing clouds which drift lazily away to the north. For a thousand centuries this scene has changed but little. The placid turquoise surface of this beautiful body of water has never been disturbed except by fitful breezes from passing storms or by the playful antics of strange, plumed water fowl of this period. No artificial craft of any nature has as yet ventured out over her unknown depths or sought refuge inside her tropical bays. Her low lying beaches offer not only a playground but also a battleground for a motley horde of strange life forms. Her meandering shore lines, as shorelines, are destined never to re-echo the footfall of man. Time hurries us through the day. The shadows are lengthening eastward. The sun slowly sinks to rest. The blackened silhouettes of the Cascades across the water fade into darkness, leaving only red blotches against the western sky - prophetic of dying craters.

Perhaps I had better pause long enough to let you in on what I have been talking about - I've tried to give you a word picture of just another day of the mid-Miocene period of Central Oregon. No doubt you will say that this is a weird bit of fancy, a fragment of a disordered imagination. But such is not the case. There exists no written history as well supported by concrete evidence as this - you need only to pay a visit to The Country which I have just described and see for yourself. The proof is abundant and convincing. You may plainly trace the old shorelines, the old deltas, and the lake floors. You can easily ascertain the extent of territory covered. The two thousand vertical feet of silt speak in no uncertain language as to the vast sweep of time endured.

The next book we encounter as we move downwards is called the Oligocene or John Day and is no less interesting than the first. The landscape changes considerably as a result of crumpling and folding; some evidence of vulcanism in the form of ash and cinders is found. Life, both animal and vegetable is changing rapidly. Species met with before do not show up here. Rhinoceros are smaller and hornless, deer seem larger and are also without horns. An interesting type encountered here is Titanotheres, a huge three-toed beast having a long depressed skull and a pair of horns near the tip of his nose, and stands ten feet high and fourteen feet long. He appears suddenly, seemingly out of nowhere - lives through this period and departs without leaving any descendents. Elotherium, the great wild boar, also is present and leaves the picture at this time.

Let us say we are now approaching midsummer. There is but little water with which to work. The West Wind is away on a long journey and, of course, Jack Frost will not be back until winter. So we will take a day off from our strenuous labors to visit some of our neighboring communities and see what might be taking place there at this time. A few miles west in the Willamette Valley areas, we are told by the geologists, the ocean covers this part of the land. But why accept the geologist's story? They were not here at this time. So we will try and verify their statements by asking the hills. The hills were here in some form or another and on slight investigation we are rewarded by a very positive answer. The hills yield an abundance of marine fossils. So we see that as the land surface east of the mountains was writing its record, the ocean to the west was writing another - and ever the story goes on.

Another volume of the library is now coming to view and as we examine the title we find it is called the Eocene which in English signified the beginning of the recent. We shall call it the Clarno intensely interesting and instructive but on account of our very limited time we shall omit the details. This volume is a very large one, covering an enormously long reach of time, but every page is jammed full of strange and puzzling things. We observe immense revolutions taking place in the earth's crust. The old Cascades arise from the sea. Mt. Hood erupts, piles up a cone some eight thousand feet high and then becomes dormant for long ages. A sudden adjustment of the earth's surface closes the upper Snake river forming a great tropical sea in the land of Payette; a country of balmy temperatures, exotic flowers, palms, magnolia, gingko and cinnamon trees.

Still moving downward, time turns her lithic pages, carrying us through many more horizons of life filled with song and sorrow, triumph and tragedy, over hills, dales and valleys, swamps and desert lands. A land in some respects as strange as Mars. Most things are vastly different from those we have seen before. The earth's first grasses are beginning to creep over the newly uplifted plains, and along with these come the first animals equipped with teeth and grinding such foods. Nature is also abandoning the feet with widespread toes and is experimenting with hoofs, because her swamplands are giving way to sodded prairies. Hoofs, too, were a great boon to such animals as these, whose only means of protection in a world infested with carnivores was speed. It was also at this period such land mammals as whales, seals, and dolphins took up their abode in the sea where they remain until this day.

Tho we have completely passed through the first set of books known as the Cenozoic, we find the old river still grinding and tearing away in her feverish efforts to uncover the next set of records, which, judging from the type of fossils we find, will no doubt be called Mesozcic. The first chapter is called the Cretaceous because of the chalk deposits of the period. Among the thrilling chapters of this wonderful volume we read of the earth's first feathered song birds, the first flowering plants, the first walnuts, oaks, ash, sycamores, and similar types of life. Strange weird species are being encountered at every turn. The West Wind is still tantalizing us with stories that lie ahead. She insists that we are just on the verge of entering a land of dragons, the Saurians or dinosaurs, fearless, grotesque, merciless as to life's hazard. This might be called the nightmare of the world. Hideous reptilian forms dominate every livable portion of the globe except the deep seas. They represent every size from the microscopic to huge mountains of flesh and bone at whose swaggering footsteps the earth trembles.

But we are getting far ahead of our story. The thing which I have been describing belongs in another chapter which the John Day holds in reserve for centuries which lie ahead.

Notwithstanding the fact that this grand old River has worked long and patiently to uncover these treasures, it is generous to a fault, for each and every spring after the snows and storms of winter have gone it welcomes us back and with a lavish hand offers us the choicest of her finds. As we gather up these priceless fragments and place them in their proper order so all the world may read the story of old Oregon, the North Fork, the South Fork, Canyon Creek, Rock Creek, Bridge Creek, Jack Frost and the West Wind smile.

REPORT OF SERVICE COMMITTEE.

The following bulletins of the University of Washington Press are available to Society members at a discount in group orders:

Vol. 1,	no. 1	Tertiary Faunal Horizons of Western Washington, by Charles E. Weaver. 1916	$1.00
	no. 2	Paleontology of the Oligocene of the Chehalis Valley, by Katharine E.H. Van Winkle. 1918.	.50
	no. 3	Fauna of the Eocene of Washington, by Weaver and Palmer. 1922	.50
	no. 4	Foraminifera from the Eocene of Cowlitz River, by G. Douglas Hanna and Marcus A Hanna. 1924.	.50
Vol. 2		The Geology of the San Juan Islands, by Roy Davidson McLellan	2.00
Vol. 3,	no. 1	The Geomorphology and Volcanic Sequence of Steens Mountains in Southeastern Oregon, by Richard E. Fuller, 1931.	1.50
	no. 2	The Geology of Mount Rainier National Park, by Howard A. Coombs. 1936	.75
Vol. 4		Tertiary Stratigraphy of Western Washington and Northwestern Oregon, by Charles E. Weaver	2.50

Other bulletins, relating to Anthropology, Biology, Fisheries, Oceanography, Mathematics and the Social Sciences are also available.

Tracy Wade
Chairman

. . . .
. Ulrich, F. P., Analysis of the earthquake problem in .
. western United States: Northwest Science, vol.11, no..
. 4, pp. 89-92, November 1937 .
. . . .

One important purpose of research in seismology is to break down the attitude of fatalism or false optimism. Fatalism arises in part from the fact that the average annual death-toll from earthquakes is about 30,000; false optimism from such facts as that the Long Beach earthquake in 1933 occurred 2 hours after public schools had closed and only so spared the United States one of the world's major calamities. In the immediate future we may expect about as many earthquakes as in the immediate past; in California and western Nevada in the last 100 years there have been 39 earthquakes equal to or greater in intensity than that at Long Beach, and for the Pacific Coast and western mountain areas there is a record of 29 earthquakes, destructive or near destructive, from 1935 to 1936. Investigation of earthquakes is understressed in the Pacific Northwest. The United States Coast and Geodetic Survey operates seismographs of two types: a "sensitive" instrument to give information on the frequency and location of all earthquake shocks, and a "strong-motion" instrument to give dependable measures of the forces set up by the earthquake , the periods of oscillation, the amplitude of vibration, and the duration of the shock. The latter factors are those that guide the design of earthquake-proof structures. Prediction of specific earthquakes prior to the event is unreliable in the United States at this time.

. . . .
. Heck, N. H., Earthquakes and the western mountain re- .
. gion: Geol. Soc. America, Bull., vol.49, no.1, pp.1-21, .
. 1938 .
. . . .

The "western mountain region" extends from the eastern edge of the Rocky Mountain region to the eastern boundary of California, the 120th meridian in Oregon, and the eastern edge of the Cascade Mountains in Washington. It excludes the main part of the circum-Pacific Belt which includes California and the Puget-Willamette trough. The report describes general features of the 84 known earthquakes of intensity 5 or greater (Rossi-Forel scale) in the region from 1852 to 1936. Of these, 17 were major earthquakes. It discusses the usefulness of instrumental and non-instrumental information on earthquakes, the relation of earthquakes to geologic features and to crustal movement, application to engineering, and the relation of earthquake occurrence to gravity anomalies. Earthquake history and expectancy is generalized for five principal subareas: (1) a sinuous belt trending eastward from Ellensburg, Washington, to Sweetgrass, Montana, (2) a Y-shaped area whose three apexes are near Union, Oregon, Helena, Montana, and Salt Lake City; (3) west-central Nevada, between Reno and Tonopah; (4) a belt trending nearly southward from Richfield, Utah, to St.Johns, Arizona; (5) western New Mexico, in the vicinity of Albuquerque.

A. M. Piper.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg.,Portland,Oregon
POSTMASTER: Return Postage Guaranteed

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 10 | Portland, Oregon | May 25, 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

EDITOR:

Edwin T. Hodge,
2915 N.W.Luray Terrace,
Portland, Oregon.

BUSINESS MANAGER

Raymond L. Baldwin
2725 N.E. 50th Avenue
Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * * * * *

Field Trips

Week-end	:	Decoration Day trip.
May 28,29	:	Leave Portland Saturday, May 28, any time during the day, either
30th	:	individually or in groups. Take Wapinitia Cut-off to Maupin, 103 miles. Take Dalles-California highway to junction 22 mi. Turn left to Shaniko, 11 miles. Leave main highway, turn square to right, to Antelope, 7 miles. 3 miles beyond Antelope, take left hand road to Clarno, 12 miles. Cross bridge, follow main road about 2 miles to oil derrick. Turn to left, opposite derrick, follow dim road between small houses ½ mile up dry canyon to camp. Late Sunday p.m. break camp and move to west side of river to mammal beds about 2 miles down the river. Return home Monday afternoon. What to take: Food and water for two days. Bedding for two nights, if camping out. Tourist accommodations at Fossil, 16 miles. Take medium weight hammer, cold chisels, small trench pick and paper or sacks for wrapping specimens.
Sunday	:	Bull Run Dam.
June 12th	:	Leader: B. S. Morrow

Lectures

Friday	:	Mr. Earl K. Nixon, director, State Department Geology and Mineral
May 27th	:	Industries, will give his impressions of mining in the South American jungles.
Friday	:	Rose Festival. No lecture.
June 10th	:	

New Members

Crogster, Mrs. Chas.	Mrs. E. H. James
1625 NW 29th Ave.	Box 583
Portland, Oregon	Oswego, Oregon

Thursday Luncheon

Beginning at 12:00 noon, May 19th, and every Thursday noon thereafter, the luncheon group will meet at:

L'ABBE'S FRENCH DINNERS
910 S.W.Salmon Street
(Roosevelt Hotel)

Prices are 40¢ - 45¢ - 50¢ and up. You have your own choice.

The dining room is on the ground floor, with a full glass front that will give plenty of daylight for the examination of rock and mineral specimens.

As to the food - well, come out and try it. Tell your friends of the change, and remember the date.

This change is made as the result of a vote taken by a canvass of 27 regular attendants of the luncheon.

- - - - - MAILING LIST OF THE GEOLOGICAL SOCIETY OF THE OREGON COUNTRY - - - - - -

* Charter Members

April 22nd, 1938

Abrahamson, Miss Elma		1524 NE Ainsworth St.
*Adams, Dr. & Mrs. W. Claude	GA 8747	2614 NE Bryce St.
*Avery, Delia	TA 2420	3585 SE Clinton St.
*Bahrs, Dr. Alice M.	AT 8047	Martha Washington Hotel
*Baldwin, Mr.& Mrs.Raymond L.	GA 6055	2725 NE 50th Ave.
*Barr, Mr. & Mrs. Amza	SU 4081	5417 SE 99th Ave.
Bates, E. N.	BE 3038	5639 SW Menefee Drive
Bixby, D. F.	SE 4281	1015 SE 26th Ave.
*Booth, Charles Frazier	LA 1450	2444 SE Clinton St.
*Booth, Dr. Courtland L.	LA 1450	2444 SE Clinton St.
Borum, C. J.	GA 1520	2235 NE 28th Ave.
Boyrie, Mr. & Mrs. Edward A.	SE 6085	6326 SE Reed College Place
*Bowie, Margaret	EA 6232	3014 SE Lincoln St.
*Brady, Helen	SU 6427	5503 SE 92nd Ave.
Burdick, Leroy E.	TR 1334	3226 NE Oregon St.
Burke, L. C.		110 Center St., Oregon City
Butler, J. Dean		200 Butler Bldg., Oregon City
Calef, M. H.	GA 3642	2405 NE 41st Ave.
*Carney, Mr. & Mrs. Thos. A.	TA 4570	7269 NE Thorburn St.
Catlin, Eva	AT 8047	Martha Washington Hotel
*Clark, Harry L.		Yamhill Electric Co., Newberg, Ore.
Collins, J. R.	EA 9831	3310 SE Caruthers St.
Cooper, Dr. H. C.	EA 0631	206 NE 31st Ave.
Crogster, Mrs. Chas.	BE 1768	1625 NW 29th AVE.
*Dake, Dr. H. C.	BE 2539	703 Couch Bldg.
*Davis, Franklin L.	TR 7568	4317 NE Tillamook St.
Doughty, Mrs. Grace	TA 2920	1215 NE 84th Ave.
*Endres, Miss Constance	GA 4598	10632 NE Skidmore St.
Gekler, Mrs. Ruth S.	GA 4631	3219 NE 67th Ave.
Greisser, Arthur H.	TR 4745	3424 NE 30th Ave.
*Hancock, A. W.	SU 5285	2704 SE 84th Ave.
*Hann, Mr. & Mrs. H. H.	TR 6849	3171 NE 35th Place
Hansen, C. J.		3540 NE Wasco St.
Harbord, A. E.	EA 1556	2039 SE 7th Ave.
Henderson, Mr. & Mrs. Dwight	EA 0814	838 SE Peacock Lane
Hickman, Miss Ruth E.	SE 0939	3203 SE Clinton St.
*Hodge, Dr. & Mrs. Edwin T. (honorary member)	BE 4821	2915 NW Luray Terrace.
Holbrook, D. C.	TR 8914	3245 NE 55th Ave.
Howell, Paul W.		920 Lincoln St.,Klamath Falls,Ore.
Holdredge, Claire P.		Cio de Petrolio Shell de Colombia, Edificio Varquez,Calle 13,no.9-20 Bogota, Colombia.
Hurst, Jane A.	BR 1321	311 NW 20th Ave.

Irving, Lewis H.		Madras, Oregon
*Iverson, Florence	TA 7504	5125 NE Couch St.
*Iverson, Helen	TA 7504	5125 NE Couch St.
James, Mrs. E. M.		Box 583, Oswego, Oregon
*Jennison, H. L.	SE 6145	1561 SE Linn St.
*Johnson, Mr. & Mrs. E.C.	TA 7118	Rt.9 Box 786 Portland
*Jones, Dr. & Mrs. Arthur C.	BE 3955	3300 SW Heather Lane
*Jones, Mr. & Mrs. Frank I.	AT 2863	304 SW Hamilton St.
Jones, Dr. Francis T.		Forest Grove, Oregon
Jennings, Rose H.	EA 0631	206 NE 31st Ave.
*Kimbrell, Geary	GA 9995	2522 NE 57th Ave.
Korell, Walter H.		Beta Theta Pi House, Corvallis, Oregon.
Kurtichanof, Mr. & Mrs. L. E.	SE 5860	8014 SE 35th Ave.
*Lazell, Dr. E. W.	BE 7896	2015 NW Flanders St.
Lawrence, Dr. Donald B.		813 University Ave. S.E. Minneapolis, Minn.
*Mackenzie, Wm., Jr.	BE 8772	1632 SW 12th Ave.
*Mackenzie, Mr. & Mrs. Ray E.	GA 4178	2402 NE 15th Ave.
MacNab, Barney		1806 SW High St.
*McNeil, Florence J.	BR 3052	1535 SW 14th Ave.
*Miller, Katherine	GA 2543	2732 NE Thompson St.
*Neff, Lillian	AT 2666	310 Lewis Bldg.
Nelson, Clara A.	UN 0869	9529 N. Edison St.
Nordgren, Emma	AT 0438	531 SW Washington St.
Nixon, Mr. & Mrs. Earl K.	BR 2276	704 Lewis Bldg.
*Norton, Russell R.	GA 8981	3516 NE 78th Ave.
Oberson, Louis E.	BE 6161	YMCA, 831 SW 6th Ave.
*Osgood, Dr. & Mrs. Edwin E.	BR 5783	285 Birdshill Road,Dunthorp,Portlan
*Paxson, Mr. & Mrs. G. S.		1695 S.Winter St ,Salem, Oregon
*Phillips, Mr.& Mrs.Clarence D.	SE 0065	7630 SE 30th Ave.
*Phillips, Mr.& Mrs.Kenneth N.	TA 5091	2213 SE 52d Ave.
*Piper, Mr. & Mrs. Arthur M.	GA 4085	516 Couch Bldg.
Platt, A. D.	BE 3284	2582 SW Arden Road
*Poppleton, Mr. & Mrs. R. R.	AT 2222	Rte 1, Oswego, Oregon
*Poppleton, Miss Grace	AT 2222	Rte 1, Oswego, Oregon
Rapraeger, Walter G.		Sperry Flour Co., Portland
Reeves, Mr. & Mrs. W. A.	Salem 4249	1085 N.16th St., Salem, Oregon
*Reimers, Fred	TA 0951	6535 SE Clinton St.
*Richards, Carl P.	BR 2022	1431 SW Park Ave.
*Rockwell, E. H.	GA 3119	2503 NE 41st Ave.
Ross, John A.		1216 Floribundo,Burlingame,Calif.
Sandoz, M. F.		Box 363, Newberg, Oregon
*Schminky, Mr. & Mrs. Harold B.	TA 2485	1030 SE 54th Ave.
*Short, Jessie M.	EA 2600	3935 SE Ash St.
*Simon, Mr. & Mrs. Leo	AT 0438	531 SW Washington St.
Simson, Mr. & Mrs. A. Gael	TR 9310	2204 NE Klickitat St.
Smith, Almeda		Rte 1 Box 239, Sherwood, Oregon
*Smith, Mabel C.	SE 0916	1350 SE Flavel St.
Smith, Dr. & Mrs. Warren D.		1941 University St., Eugene, Orego
Stanley, O. E.	TA 1250	2601 SE 49th Ave.
*Stevens, Mr. & Mrs. J. C.	EA 9333	434 NE Royal Court
Stockwell, H. Mildred	SE 4281	1015 SE 26th Ave.
Swartley, Arthur M.	BR 2276	704 Lewis Bldg.
Tallman, J. W.	BE 4021	435 SW Stark St.

*Teeters, Glenna M.	GA 6205	3107 NE 32d Ave.
Travis, H. F.	GA 6349	5905 NE Milton St.
Treasher, Mr. & Mrs. Ray C.	TA 3683	415 SE 45th Ave.
Underwood, Dr. H. L.	MU 6412	10 NE Ainsworth St.
*Vance, Mr. & Mrs. A. D.	MU 5204	5516 NE Rodney Ave.
Van Scoy, Paul	Salem 5648	1000 Chemeketa St., Salem, Ore.
*Wade, Mr. & Mrs. Tracy	TR 6060	4204 NE Broadway
Walker, Mrs. May V.		Rt. 1 Box 564, Oswego, Oregon
Watson, Prof. Jesse R.		Forest Grove, Oregon
Weber, Dr. & Mrs. D. E.	TA 9343	404 SE 80th Ave.
Weber, J. Martin	BR 0735	1520 SW Montgomery St.
Wheeler, Mr. & Mrs. Chester A.	GA 8243	2944 NE 47th Ave.
White, Mella C	TA 9398	4327 NE Glisan St.
Wiegand, C. F.	TR 4459	1100 Imperial Ave.

* * * * * * * * * * * *

A GLANCE AT CENTRAL AMERICA.

Dr. C. B. McCullough,
Asst. State Hwy. Engr.

On a certain September morning in the year of grace 1502, a tiny ship rode at anchor in a sheltered cove in the west Caribbean. It was the "Capitana", the flag-ship of Don Christopher Columbus, and the place was "Carare", now called Port Limon.

The rugged Admiral had aged since '92. This his fourth and last voyage and this morning he found himself too weak and ailing to put ashore. Presently his brother Bartolome' shoved off with a small boat and crew, later to return with a group of aboriginals. Strange people these! Wrinkled tribesmen and stalwart braves and maidens who danced so immodestly before the old Don, so history tells us, that, in righteous dudgeon he had them put ashore forthwith. Because these native folk wore ornaments of glittering gold, and because they indicated, by signs, that great deposits of the metal lay within the hinterland, Don Christopher called the place "Costa Rica" (rich coast). A few days later he sailed away, and out of our picture. In a short time he was dead. He never saw the place again, but Costa Rica it is to this day.

This southernmost of the Central American Republics is a land of breathless beauty. Twenty-three thousand square miles in area with a population of some 516,000, this little Republic boasts the finest coffee grown in the world. Bananas, beans, sugar-cane, corn, rice, tobacco and cacao are among its other agricultural products, and gold (both sulphide and free-milling ore), manganese, iron, copper, sulphur, graphite, and coal (lignite and some anthracite) compose its principal mineralogical wealth. Asbestos is also said to exist in one of the provinces.

Steeply from each coast line rises the terrain of northwestern Costa Rica to a junction with the Central Cordilleras. This twin volcanic chain, probably young eruptives of the Pliocene and later, frame in perfect panorama the gorgeous "Meseta Central" (central plateau), whose area is some 3500 square miles, whose mean elevation is well over 3,000 feet, and whose confines shelter nearly 75% of the inhabitants. Here the climate is superb, the temperature varying from 65 to 85 degrees the year round, with nights delightfully cool. The annual rainfall is some 75 inches, but it rarely rains before noon, and the tropic mornings are truly magnificent.

In the northeast Cordillera lie the volcanoes Irazu (11,320 feet) violently eruptive at intermittent intervals, smoking Turrialba (11,000 feet), and Poas (8,780 feet), whose crater over a mile in width is never completely quiescent, and is said to be the largest in the world. Through this chain to the east breaks beautiful Rio Raventazon down into Turrialba Canyon where, in 1666 the Costa Rican army massed itself to hurl back that mighty buccaneer, Sir Henry Morgan, down into the lowlands, once the abode of malaria and the "black water death", down where the heat is oppressive, the rainfall torrential (220 inches per year) and the multi-colored flora transform the terrain into a veritable kaleidoscope.

Geologically Costa Rica is comparatively young. The Mesozoic seas as late as Cretaceous time doubtless rolled over a submerged terrain, a land mass which was later lifted, probably in the early Eocene. Schuchert quotes Lohmann as stating that this early land mass was again invaded in the late Eocene and that the Oligocene probably witnessed a <u>second</u> complete submergence. During Miocene time great folding and faulting upthrust a second land mass, having much the same general outline as at present. Further folding during Pliocene time resulted in the definition of the twin Cordilleras which frame the beautiful Meseta Central.

NICARAGUA.

North of Costa Rica lies Nicaragua, the largest of the Central American group, with an area of some 49,000 square miles, and a population of about 640,000. This republic derives its name from an Indian chieftain "Nicarao", who in 1522 made a treaty with that great explorer and missionary Gil. Gonzales. History records that Nicarao, before agreeing to induction into the Christian faith, wanted to know: (1) what held up the moon, (2) who moved the stars, (3) where the soul was located, and (4) how Christ could be God and man at the same time, and his Mother a virgin. Unfortunately, history does not record Gonzales' answers, so we must perforce get back to earthly things.

The geology of southern Nicaragua is much the same as that of Costa Rica. During Miocene time, the Pacific Coast line extended many miles to the east of its present location. The Pliocene Cordilleras of Costa Rica extending northwesterly threw up a barrier, impounding these waters and causing them to rise until they broke through the Continental Divide to the east, forming Rio San Juan, a stream of particular interest to Americans today because of the fact that it forms part of the route of the proposed Nicaraguan Canal. This upthrusting of the Pliocene chain shifted the Continental Divide westwardly to a location very near the coast line. There are points in Nicaragua where the crest of the Cordilleras lies within ten miles of the present Pacific shore.

Two inland lakes were formed by this upheaval. Lake Managua, having a length of 36 miles and width varying from 6 to 20 miles, lies to the north. Its mean elevation is 128 feet. It overflows through Rio Tipitapa into Lake Nicaragua to the south. This latter body of water has a length of 105 miles, a mean width of 40 miles, a depth of about 90 feet, and a mean elevation of 105. In 1914, Secretary Bryan negotiated a treaty with Minister Chamorro of Nicaragua under the terms of which the United States, in consideration for the sum of $3,000,000, was granted the exclusive right to construct and maintain an inter-oceanic canal by cutting through from the Pacific to this lake, and its eastern outlet, Rio San Juan.

About 50% of the population of Nicaragua resides in a belt some 25 miles in width along the Pacific Coast line. To the eastward and north of the lake lies the cattle country, which sectr in turn is bounded on the east by the mahogany country, an uninhabited wilderness of rolling hills and large rivers. Still farther east is the Caribbean littoral, extending some 40 miles inland and composed largely of swamp land. Bananas and cocoanuts are the only products grown in this last sector.

HONDURAS

Honduranian soil (the present Cape Honduras) was first sighted by the white man in August 1502. This was during Columbus' fourth and last voyage and about a month before his previously described landing in Costa Rica. The first Spanish settlement in this Republic was made by Cristobal de Olid under orders from Cortez in Mexico. Olid tempted by reports of silver and gold, attempted to set up an independent government following which Cortez performed one of the most daring acts in all Spanish-Colonial history by marching overland from Mexico through jungles and over mountain chains, suppressing the insurrection and assuming complete control. He founded Puerto Cortez on the north Caribbean Coast in 1525 and returned to Mexico in 1526.

This Republic is probably the most heavily mineralized of the Central American group. Many thousands of acres of gold placers have been located, and in some of the provinces are found vestiges of ancient Indian and Spanish workings. Silver, copper, lead, zinc and iron are also present in considerable quantities, and antimony, mercury, nickel, asphalt, bauxite, chalk, coal, gypsum, marble, opals and saltpeter have been reported from time to time. About 60 miles from the Gulf of Fonseca lies a deposit of zinc-manganese silicate (Franklinite) which is said to exceed that at Franklin Furnace, New Jersey.

The topography of Honduras is greatly broken, the western section consisting for the most part of alternate layers of andesitic tuffs and late lava flows. This material rests upon a supporting structure of low relief, evidencing much faulting and folding. Crystalline lime stones, gneisses, schists and granites of pre-Permian time are found in the basement structure to the northeast. This basement series is thought to be part of the ancient antellian geanticline which passed through Guatemala and Honduras and easterly to Jamaica.

GUATEMALA

This northernmost Republic of the Central American Group has an estimated land area of some 42,000 square miles, and a population considerably over two million. It was first invaded by the Spanish by Don Pedro de Alvarado in 1522, who, by 1524, had reduced the aborigines to terms and had founded the first capital at the present site of the Indian village Tecpam. In 1527 the capital was removed to a second site (now known as La Ciudad Vieja). This city was destroyed in 1543 by an eruption of the volcanoa Agua. A third capital, built along the banks of El Rio Pensativo endured until 1773, when it, in turn, was destroyed by an earthquake accompanied by an eruption of the volcano Fuego.

Northern Guatemala is a lowland of Cenozoic limestones and marbles while through the southern portion the antellian geanticline extends westerly and into the Pacific. These older strata contain bands of serpentine and granite, and isolated areas of the so-called pre-cambrian crystallines. Superimposed upon this basement structure is a younger chain of andesite eruptives containing many young volcanic cones. Interesting among these are Acatenango, Agua and Fuego each of which reach a height of over 13,000 feet. The volcano Santa

Maria near Quezaltenango became active in 1902 at which time the southern side of the peak was entirely blown away and an auxiliary crater formed. There are, in all, 18 volcanic cones in this region, and together they present a magnificent spectacle.

Guatemala is of particular interest to the traveller because of the fact that its terrain cradled the civilization of the "Old Empire" Maya. The ruins of Uaxactun in the Peten district contain the first dated monument which corresponds, according to the Spinder count, to June 16, 68 A.D. Next, in point of time, are the cities of Tikal (185 A.D.) and Copan, (195 A.D.).

The ancient Mayan is an interesting study. Short of stature, with a peaked head (artificially malformed by skull binding) indulging in religious rites cruel and revolting in the extreme, he remains nevertheless, the creator of one of the finest examples of sculpture and architecture the world has ever seen. The greatest accomplishment of the Maya, however, was his calendar. It has been said that the Mayan calendar stands today as the greatest achievement in pure science of any people on a parallel culture plane, the result of centuries of painstaking effort by scientists handicapped by the lack of any scientific instruments. His fundamental time unit was the "Tzolkin" or sacred year of 260 days, each individual day being identified by the combination of one of 20 day names with the numerals 1 to 13 inclusive. Superimposed upon this sacred calendar was a solar calendar of 365 days, consisting of 18 months of 20 days each, and one five-day period. Since the lowest common multiple of 260 and 365 is 18,980, the Maya, by using both systems of enumeration, was able to define uniquely each individual day in any particular cycle of 18,980 days, or 52 years. No regular or periodic correction corresponding to our "leap year" was made by the Mayans, but from time to time astronomical congresses were called for the purpose of revising the calendar. Such meetings were generally held at Copan, and the equation used for calendar correction was as follows:

1508 official years (365 days)= 1 507 tropical years.

This resulted in the establishment of a tropical year of 365.2422 days, a determination more nearly correct than our present Gregorian calendar! And all this precision without astronomical instruments of any kind or character!

Volumes could be written about these early Americans, and more volumes concerning the terrain which cradled their civilization, but space is insufficient to permit further comment.

And so let us say good-bye to this most intriguing section of the Americas. A sector representing to the geologist infinite possibilities for research, to the historian the beginning point of European civilization in America, to the archeologist a veritable treasure house of ancient lore, and to the nature lover a vista of smoking cones and crystal lakes and a tropic flora whose magnificence is unsurpassed on earth.

If we are inclined to weary with the slogan "See America First", let us not forget that, for most of us, there is much of America yet to be seen.

THE SANDY RIVER TRIP - July 4, 1937.

H. B. Schminky, leader.

An overcast sky greeted the forty-seven people who gathered at 6th and Yamhill to celebrate the 4th of July in the exploration of the Sandy River valley. Shortly after 8:00 A.M. the caravan left for the summit of Rocky Butte, where the trip leader had hoped against fate to be able to point out the terrain to be covered on the trip. But the lowhanging clouds hid the backdrop of the stage, so that much of the picture was lost. So the poor weak words of the leader had to set the stage.

Looming high on the skyline to the eastward is Mt. Hood, sitting as king at the far end of his throne room. His court, consisting of the higher peaks of the Cascades, stands in rows along the sides of the Sandy river valley. In the foreground of the throne room, made by the so-called Portland delta formation, we find a humble group of the king's subjects awaiting the slightest recognition from their majesty. These subjects the volcanoes to which Rocky Butte and Mount Tabor belong, border the north and south banks of the Clackamas river to the southeast of our viewpoint. - That is the picture we should have seen if the clouds had not been there and if we had let our imagination run away with us.

But Dr. Hodge painted another picture for us. To see this scene, our view point would have to be a boat on an ocean bordering the Cretaceous land mass in the eastern portion of the state. As time passes we would see an uplifting of the sea bottom between our boat and the old shore line. Mountains would be folded into the new land and eroded away, and the Eocene sea on which our boat is now sailing is rapidly becoming more shallow from the debris washed from this new land. Now real danger threatens our craft for volcanoes begin to erupt on the land we have been watching. Many times we shall be dashed about by tidal waves or forced to run from the clouds of ashes that these volcanoes are pouring out over the land and sea if we wish to stay near enough to see the end of the Oligocene. We find that a range of low volcanic mountains lines the shores - the first Cascades. But as the Oligocene time passes, we find that we must sail westward to escape the filling of the ocean by the sediments washed from the land or cast out by the volcanoes.

It is now the beginning of the Miocene. Again we see the land gently folded into mountains and erosion begins its work of removing them. Now comes an event that will force us to sail our boat far out beyond the present shore line. The earth seems to open everywhere and lavas flood the land. All of the old land surface was buried by this greatest of all lava floods - the Columbia River basalts. These lavas are designated as the "Coriba" formation for shortness by Dr. Hodge. In places they attained a thickness of 5000 feet. As the Miocene draws to a close and the Pliocene time begins, we again see the land folded into mountains. A new range appears along the coast and the ocean is now completely crowded from the land. What now, if we wish to follow our picture? The land is still a seething volcano so we fear to land. So we will keep to our modern selves and take to the air to follow the events taking place on the new continent. And what a sight it is! The Coriba surface shows many fault zones as the folding goes on. One long north and south fault in the vicinity where we first began our watch of the growth of this new land holds our attention. It follows the easterly side of a low mountain range. It is well that we have noticed it, for smoke and steam are beginning to break out along it at many places. With a cry of "there she blows" our pilot banks our plane and carries us away from the first eruption of the first volcano in the present Cascade range. The Cascade andesites the "Cascan" formation by Dr. Hodge - is piled high over the old mountains along this fault line. Towering volcanic cones dot the summit of this new mountain range. The ice age comes and goes. Huge lakes form behind the barrier of this range and rise to seek outlets across its lowest divides. River systems gradually develop. The streams carry great loads of sediments into the lowlands. The troughs of the synclines are filled, low hills are completely buried while higher ones are left as steptoe buttes. The glacier remnants of the ice age are destroying many of the high peaks - Mt. Hood is in this group. But vulcanism begins again and our mountain is rebuilt for us, although not on as large a scale as it first appeared. And now, as always, erosion is trying to destroy the land we have seen born. The fires of Vulcan have been allowed to die down. The great lakes have been drained. Now we can safely land our plane and go about and explore one small portion of this wonderful new land.

The gravels of the so-called Portland delta are the first of the formations to be discussed These gravels and the interbedded silts and sands are known to be at least 1200 feet in depth in the Portland area from the log of the old Ladd well in Laurelhurst. All the beds exposed in gravel pits or road cuts show cross bedding. The foreset beds show that the stream that carried these sediments was a meandering one. As there are many quartzites and other foreign rock material found among the gravels, we assume that they were carried from the mountains to the east of the Cascades. Gravels and sands are found to elevations of over 600 feet on the slopes and summits of many of the hills between the west side of the Willamette River and the Sandy River, showing that much material has since been carried away by erosion. It was pointed out that the rains soak into this gravel and sand soil almost as fast as they fall so that there is no surface runoff from most of the area between Portland and the Sandy river or between the Columbia river bottoms and Johnson creek.

The caravan then proceeded to the area of volcanic cones that lie between Johnson creek and the Clackamas river and from Mt. Scott east to Deep creek. In a quarry on Foster road about a mile and half east of 122nd Ave., the lavas of these mountains were examined. They are light in color, both fine and coarse grained in texture, show flow banding in places, and are more or less vesicular. They were thought to be andesitic in origin. Lying on the lavas above the quarry faces were gravel beds.

The next stop was on Jennie road about a mile from the quarry. Here it was seen that Johnson creek had cuts its valley between the main mountain mass and a lone butte on its north bank. From the visible topography today, there is no apparent reason for the creek not having passed this butte on the north also.

The caravan continued to the Powell Valley road, thence to Gresham, and to the south side of the Sandy river on the Base Line road. Here the road cut reveals a thick bed of unassorted gravels and boulders and fine glacial flour. This, Dr. Hodge told us, came from an ancient glacier on the first Mt. Hood. The delta gravels lie above this bed, while below are the cemented gravels, sands and clays of the Troutdale formation. Below the Troutdale should be the Coriba series.

From this point the itinerary followed the Kerslake road, which leaves the Base Line road on the right just above the bottom of the hill at the Sandy River bridge, to the Section Line road, thence along the Section Line road to the Altman road, south on the Altman road to the Lusted road, thence easterly on the

Lusted road. This route crossed several old terraces of the Sandy river and revealed the beginning of a young drainage system across them. The Lusted road follows one of these terraces for several miles before it makes its last descent to the Sandy river at Dodge Park. From this terrace a good view is had of a bed of columnar lava exposed on the bluff along the east side of the Sandy river. While the caravan paused to discuss this formation, several cars stopped to see the wreck that their occupants were certain we were looking at. One woman was heard to say to a newly arrived group - "Oh, it is only some old guy raving about the clay in the river" - in a very disgusted tone of voice.

The caravan took the first road leaving the Lusted road to connect with the Bluff road leading to the town of Sandy. In this stretch, the Bluff road crosses a series of valleys whose natural drainage is westward to Johnson creek. The east ends of these valleys are beheaded by the Sandy river. It was pointed out that the northern branches of Deep creek, a tributary of the Clackamas, are beheaded in the same manner near Sandy.

The lunch stop was made in the grove of timber at the site of the Marvel Inn. Here, on a clear day, one may enjoy a truly marvelous view of the Sandy river canyon and Mt. Hood. Our view was only one of low scudding clouds. Lunches out of the way, the caravan proceeded east along the Mt. Hood highway to the junction of the Marmot road. (11.6 miles east of Sandy). Here the Sandy River was crossed and the party proceeded westward along the north side of the river. A stop was made to examine the gravels carried by the river, andesitic types predominated.

About 1.3 miles west of the bridge, and in a grove of young firs to the right of the road, sets a giant rock, composed of agglomerate. This boulder is only about twenty feet long and about 15 feet in width and height. It is too far from the sides of the canyon to have rolled there, and as Dr. Hodge pointed out, it rests on one of its most unstable sides. The conclusion is, therefore, that it is a true glacier erratic. Dr. Hodge told the party that this erratic was in the terminal moraine of the last glacier to come down the Sandy from Mt. Hood.

The road now climbs to the ridge dividing the Sandy and Bull Run rivers and follows it for several miles after passing Marmot. The clouds prevented the party from enjoying the fine views to be seen here. A stop was made at a rock quarry at the right of the road near the west end of the ridge. Here, overlying the andesite, was a bed of gravels that Dr. Hodge pronounced as glacial moraine.

The next stop was in the town of Bull Run. In the bottom of the Bull Run river is exposed an agglomerate, which Dr. Hodge said belonged to the Rhododdndron formation. Here the agglomerates are overlain by Troutdale. The geologic column is:

Cascan - andesites . . . . Pleistocene
Rhododendron - tuffs and agglomerates . . Early Pleistocene or late Pliocene
Troutdale - Gravels, tuffs, sands and clays. Early Pleistocene or late Pliocene
Coriba . . . . Middle Miocene
Eagle Creek (Warrendale) - tuffs . . . . Oligocene

From Bull Run the caravan proceeded northward across the "Cosan" (Columbia river - Sandy river) slope. This is the surface produced by the westward limb of the anticline that makes the Cascades. It has a southwest dip that can be traced for miles to the south. The road joins the Columbia river highway at Hillsdale.

The last stop of the day was made at the Base Line road bridge across the Sandy river where the party examined the Troutdale formation at its type locality.

No excuse is offered for the lateness of this report.

H. B. S.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed

PORTLAND
OREGON

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 11 Portland Oregon June 10 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * * *

Field Trips

Sunday : Bull Run Dam
June 12th : Leader: Ben S. Morrow

Caravan will leave starting place 6th & Yamhill at 9:00 A.M. Stops will be made at Mt. Tabor Reservoir and other points of interest on way to Bull Run Dam. Christening of Ben Morrow Lake.

Sunday : No trip.
June 26th :

Week-end : For those members of Society who find it impossible to make the
July 2-3-4 : Wallowa vacation trip, a three-day trip over the Fourth of July week-end has been planned. Dr. Packard has invited us to the summer camp which is being held on Coos Bay. Mr. Vance is attending the school and will have more information for us, and it will be published in our next Bulletin.

Lectures

Friday : Rose Festival - No lecture.
June 1oth :

Friday : James Stovall
June 24th : Title to be announced.

WALLOWA TRIP

Everyone going to Wallowa Lake should make reservations at once: Write to:

Williamson's by the Lake,
Joseph, Oregon.

The official first day of the camp is set for July 5th, due to many of the cabins being reserved for the 4th.

Rates are: Meals $1.50 per day per person, or $18 for 12 days.
Cabins for four people with bedding, $48 for 12 days, or $12 per person.
Cabins for four people without bedding, $40 for 12 days, or $10 per person.

Camping space is available for those who desire to use their own tents.

There will be a $3 camp charge for non-members who are not guests of members.

State that you are with the Society in your letter for reservations, or you may be told the camp is filled.

I must have a list of those making reservations, so please call or write me when you send off your reservation requests. This is important if you want the rates we are getting.

Those making the trip should be innoculated for tickbite, as a safety measure. No danger is expected, but better be safe than sorry.

Everyone should purchase or at least read "The Ore Deposits of Northeastern Oregon", by Arthur M. Swartley, and the "Geology of Part of the Wallowa Mountains", by C. P. Ross. Both publications are very readable and are available through the Department of Geology and Mineral Industries, 704 Lewis Building.

The only maps of the area are those of the Forest Service. The Wallowa National Forest and a folder on the Eagle Cap Primitive Area may be had from the Librarian in the Postoffice Building at Broadway and Glisan.

Get those reservations off at once, and let me hear from you.

H. B. Schminky
1030 SE 54th Ave.
Phone TA 2485

Addition to our Library

Physical and Economic Geography of Oregon: Chapter XIII, The Wallowa Mountains and Country, by Dr. Warren D. Smith

This bulletin was presented to our library by Dr. Smith. Those members of our Society who are making trip to Wallowa Mountains should read this bulletin before they go, as it contains valuable information on this region.

News of Our Members

Mr. A. W. Hancock will be with a party in the John Day region during June. Dr. Beck, of the Central Washington College of Education, will be with the party.

*

Miss Florence J. McNeil and Carl P. Richards, charter members of the Society, were married May 26th. Mr. and Mrs. Richards have the best wishes of our organization. Their new address is 1131 SW Montgomery St.

*

Dr. and Mrs. Arthur C. Jones were At Home Friday evening, June 3rd, complimentary to Mr. and Mrs. Carl Richards. Over 60 members of the Society were present. A full report of the evening will appear in an early issue.

*

Dr. Osgood just returned from an extended trip which took him as far east as the Atlantic Coast. On May 2d he spoke before the American Society of Clinic Investigations at Atlantic City, N. J. He was also guest speaker at the meeting of the Texas State Medical Society at Galveston, held May 10th to 12th. Dr. Osgood stopped at Carlsbad Cavern on his way home. At our Thursday noon luncheon he gave us a brief talk on the caverns and showed some fine descriptive literature on them.

Mr. J. C. Stevens had the honorary degree of Doctor of Engineering conferred upon him at the recent Commencement exercises at O. S. C.

Mr. G. S. Paxson received the degree of Civil Engineer at the same Commencement.

Mr. J. Martin Weber received the degree of Master of Arts in Education.

*

Last Friday night, June 3rd, our President spoke before the Agate and Mineral Society on "The Nonmetallic Minerals of Oregon".

*

Over Memorial Day two of our noted fossil hunters, Franklin Davis and Tracy Wade, made a trip into the Fossil Lake area. They brought back some nice specimens. We have seen part of the collection and we hope to have a write-up soon about this trip. They stopped at Bend and Madras for short visits with our good friends, Phil Brogan and Turk Irving.

*

We understand ticks were not on a vacation when the Geological Caravan was in Clarno region over Decoration Day.

Report of Service Committee

The following bulletins of the Geological Society of America listed in the Bibliography of Geology and Mineral Resources of Oregon are available at the prices noted.

Title	Author	Date	Price
Cretaceous and Early Tertiary of Northern California and Oregon	Diller	1893	$0.40
Triassic and Jurassic in the Western States	Hyatt	1894	0.60
Shasta-Chico Series	Diller	1894	0.45
Hanging Valleys	Russell	1905	0.15
Jurassic Flora of Oregon	Diller	1908	0.50
Marine Oligocene of the West Coast of North America	Arnold	1918	0.15
Deccan Traps	Washington	1922	0.60
Bars of Channeled Scabland	Bretz	1928	1.15
Columbia River Fault Scarp	Hodge	1931	1.00
Exceptional Moraine-like Deposits in Oregon	Hodge	1931	0.40
New Evidence on the Age of the John Day Formation	Hodge	1932	0.15
New Version of the Spokane Flood	Allison	1932	0.60
Paleozoic Systems	Ver Wiebe	1932	0.70
Mesozoic Systems	Ver Wiebe	1933	0.60
Newberry Volcano, Central Oregon	Williams	1935	0.60
Glacial Erratics in Willamette Valley	Allison	1935	0.25
Basaltic Rocks in the Umpqua Formation	Wells	1935	0.15

Tracy Wade, Chairman

THE THUNDER MOUNTAIN MINING DISTRICT OF IDAHO

Leslie C. Richards.

The Thunder Mountain Mining District of central Idaho is interesting principally because of three things: its history, its peculiar type of ore deposits, and its extreme isolation. These observations were made during employment by the Thunder Mountain Mining Co., in the winter of 1937-38.

The Thunder Mountain district is located in the northeast quarter of Valley County, Idaho, approximately two hundred miles northeast of Boise. It is in the center of one of the most extensive mountainous regions within the borders of the United States. Canyons three thousand feet below the ridges are common and in a few places, as on the South and Middle Forks of the Salmon River, the relief is six thousand feet. The average elevation of the ridges is nine thousand feet. Thunder Mountain, itself, is a prominent ridge between Marble Creek on the east and Monumental Creek on the west. Marble Creek flows southeast and joins the Middle Fork of the Salmon about thirty miles from Thunder Mountain. Monumental Creek flows north for fifteen miles to Big Creek, which in turn flows east to the Middle Fork at a point forty miles downstream from the mouth of Marble Creek. There are fine stands of white pine at lower elevations in some of the canyons. The ridges are timbered with smaller lodgepole pine. Deer and elk are plentiful, occasionally mountain goat and sheep may be seen.

The district was discovered shortly before 1903 and in that year the Thunder Mountain boom started. The statement has been made on different occasions that this was the last of the major old western mining booms, and at its height there were at least ten thousand people in this district. It is remarkable that the only means of access was by trail, and consequently most of these people had to pack in during the summer, and snowshoe or ride a dog team during the winter.

The three general routes of entry began at Salmon City from the east, at Long Valley from the west near the present town of Cascade, and near Elk City and Dixie from the north. The trail from Long Valley was about one hundred miles in length and was probably the easiest. The original discovery was bought by Colonel Dewey of Silver City fame. His property, the Dewey mine, proved to be the only profitable venture of the district, Government records showing production in excess of one half million dollars. During the boom, ground was staked for miles around the Dewey mine, some by conscientious prospectors, but a fair share was done by others with the purpose of promotion in mind. The typical boom town of Roosevelt sprang up on Monumental Creek, and flourished for four years until it came to a most unusual end. One night in 1907, a mud slide came down from Thunder Mountain and dammed the canyon just below the town. It wasn't long before a lake covered the spot that had been Roosevelt. Today one can see log cabins and even two story frame structures through the clear water of the lake.

The state of Idaho appropriated one hundred thousand dollars to build a wagon road from Long Valley to Roosevelt, in 1904 and 1905. Portions of this road are still used, but most of it has been replaced by forest service roads that are more suitable for auto and truck traffic. Several mills were built after the road construction. To mention a few, the Dewey mill of twenty stamps, the Bellco mill of fifty stamps, for use with the Sunnyside mine, and the Twentieth Century mill were among the larger mills. The nearest rail point was Emmett, Idaho. As the cost of transportation from Emmett was in most cases greater than the factory price of the machinery, these mills were left intact when the boom broke. In fact, in the purely promotional schemes, some of the machinery was never assembled, and may be seen today still in their crates.

The rocks of this area are grouped together as the Challis Volcanics of Miocene age described by Clyde P. Ross in his paper on the Thunder Mountain District (vol. 28, no. 6, Economic Geology, 1933), and consists of a series of rhyolite and basalt flows, and mud flows. The auriferous deposits occur in brecciated rhyolite flows, as blanket veins immediately under a mud flow capping. The gold is free and of fine size, associated with iron oxide along the fractures in the brecciated rhyolite. The hanging wall is maintained three or four feet below the mud flow in mining; the foot wall is an economic limit depending upon the location. In the old Sunnyside Mine, now operated by the Thunder Mountain Mining Co., A. H. Sperry of Spokane, president, the average stoping width is thirteen feet.

The Thunder Mountain area still remains one of the most isolated spots in the United States. Even though the use of aeroplanes has improved transportation conditions tremendously since the old boom days, the camp is snowed in from the first of November until June. From June until November the camp is reached by a good one hundred mile forest service road from Cascade, Idaho. During the winter, mail and passenger service is maintained by plane to Stibnite from Cascade. The Company keeps a dog team which makes weekly runs to Stibnite, weather permitting, a distance of 18 miles for the mail. When supplies or broken machinery parts are needed, arrangements are made for the plane to fly over camp and drop the needed articles.

The present company has been operating for over a year with a fortyfive ton amalgamation and flotation unit. A one-hundred and fifty horsepower diesel is the power unit. During the past year, with careful sorting of the ore in the mine, an $8 mill head average was obtained. It will be interesting to note if the present operation, with the increased price of gold, more efficient milling machinery, and a sincere conscientious effort can make a success in an abandoned mining district, that has been givena black name by promotors' actions of the past, and perhaps be the starting force of reviving it to its former importance.

MINERALS AND BONNEVILLE POWER

It is becoming evident that the use of a part of Bonneville Power lies in industry. During the construction of the dam many believed that there was insufficient domestic, rural and commercial business available in the Northwest to enable the project to pay its own way without government subsidy or a greatly increased settlement of much vacant territory. It was even called the "Dam of Doubt", by a prominent national weekly.

Since the dam's completion, the philosophy of the distribution of power from it has been considerably modified. Less emphasis is now laid upon domestic consumption as an exclusive source of revenue. A more equitable division of power supply between industrial and domestic consumers is in prospect. This has resulted from various surveys of the distributive area, its population and their desires, its electric and employment needs, and a partial inventorying of its raw materials. The proposed diversified rates, recent published statements of the dam's administrator, and a more complete knowledge of the complexities of distributive costs now indicate a substantial use of electric energy in electrochemical, electrometallurgical and general industry.

This diversified use of electric energy will, undoubtedly, fulfill the expressed desire of the President that the dam shall serve with "a distribution of power for the greatest good of the greatest number of people". A greater industrial power load will give a smoother and better balanced load curve at the generating plant through a longer daily use of current, increase the plant revenue and eventually result in lower rates to all. New industries using power on three shifts will employ much labor now idle during the slack winter season. Additional payrolls and the introduction of new industrial commodities will increase mercantile trade within the area. Yet, there will always be available ample daylight and peak load power for wholesale distribution at low cost to domestic users in rural and urban areas. Eventually, the Northwest and every class of citizen within it will greatly benefit by an increased use of industrial power and everyone may be congratulated on the changing view point. The coming of electrochemical and electrometallurgical industries to the lower Columbia River area, with their attendant payrolls in mining, reduction, fabricating, transportation and distribution of many now dormant western raw materials will stimulate not only the territory immediately adjacent to Bonneville but many districts considerably distant from the damsight as well.

Of all of the various surveys recently made of the region adjacent to the dam one of the most important is that of certain mineral resources conducted by Doctor Edwin T. Hodge, Consulting Geologist, under the auspices of the War Department of the United States. Toward the closing period of construction of the dam, the local Army Division Engineer, Colonel Thomas M. Robins, realized that there was a possibility of a far greater use of electricity in prospect than most people then contemplated, particularly in the establihsment of electrochemical and electrometallurgical industry in the lower Columbia River area. He, and a few others, foresaw that, due to the location of power at a tidewater point, any large industry utilizing raw materials derivable from the interior could, in case of shortage, supplement its requirements by importation from other localities by means of water shipments. He, and others, came to the conclusion that this feature would alone make the area one of substantial, long-lived industries.

Colonel Robins, therefore, appointed Doctor Hodge, Consulting Geologist of the Division Engineer's office, as the Director of a Mineral Survey, and empowered him to investigate the more important industrial mineral supplies known and reported to occur within the territory tributary to the dam, and particularly those adaptable for economic use by means of electric energy.

Doctor Hodge assembled a staff of geologists, mining engineers, chemical engineers, traffic experts and technologists, with the necessary field and office assistants, and field work was prosecuted from August 1936 until September 1937, a period of thirteen months, while the final preparation of the collated data continued thereafter until summarized in book form and made ready for distribution and sale. These books are now available and are well worth the perusal of everyone interested in the development of the Pacific Northwest and its mineral resources.

The territory covered by the survey consisted of the three Northwestern states of Idaho, Washington and Oregon. The minerals investigated were coal, iron, manganese, limestone, silica, magnesia, fire and china clays. Only known or reasonably certain deposits were examined. For each selected mineral deposit the work included field examinations, quantity and quality estimates, mining and beneficiation costs, analyses of the raw material, property description and maps, transportation routes, rates and market studies. In addition, a wealth of technical information with respect to the use of electric power as applied to the reduction and treatment of the various minerals was assembled. Studies of recent and the most adaptable technologic processes designed to produce commercial products from the minerals found were made and compared, costs being given when available along with unit consumptions of electric current per pound or ton of product. Promising experimental processes are described in detail. Market studies were made comparing local costs of mineral supplies from the investigated area with similar supplies importable from localities elsewhere, and transportation routes and charges from remote and diverse regions were included.

Furthermore, the deposits were frequently compared with each other and with possibly competitive deposits to determine if they could be successfully utilized by proposed electrochemical and electrometallurgical industries seeking a location within the area. Some deposits were recommended that would be the most economically useful in connection with hydroelectric power as a reductive or treatment agent.

In the short period of time available for the work of the survey, it has apparently accomplished a very valuable and detailed descriptive and analytical survey of the location and possible uses of many Northwest mineral supplies, as well as those lying in many competitive areas. The work is of great interest to all industrially minded citizens of the Pacific Northwest and to those elsewhere who are contemplating an active participation in its future industrial development. The survey has unquestionably pointed the way toward a more complete coverage of all of the natural resources of the region and the ultimate absorption of all of the surplus power available at Bonneville, as well as the power that will be obtained from a sister dam that may later be constructed at Umatilla. With these two dams at the either end of a vast tidewater lake, one of the greatest industrial areas in the world may ultimately be created. The citizens of the Northwest should familiarize themselves with all of the natural resources available within their own territory and that may be brought there for beneficiation in order to take advantage of an extraordinary location wherein tidewater power and extremely low electric energy rates may combine to build a wonderfully productive industrial empire.

Both Colonel Robins and Doctor Hodge are to be congratulated on this first attempt to supply reliable and accurate information on the mineral supplies of the Pacific Northwest and it is to be hoped that many of our leading citizens will expend the time, money and effort to acquire a knowledge of the fruit of their labors. Much more work of this nature remains to be accomplished and familiarity with what has been done will enable our citizens to act intelligently in the further development of the great Pacific Northwest..

The following list covers the books so far published by the War Department, and they may be obtained from the Office of the Division Engineer, 523 Pittock Block, Portland, at the prices indicated:

1. Available Raw Materials for a Pacific Coast Iron Industry. 5 volumes, price $6.00, Dr. Edwin T. Hodge.

2. Preliminary Report on Some Northwest Manganese Deposits, Their Possible Exploration and Uses. 1 volume, price $.75. Dr. Edwin T. Hodge.

3. Market for Columbia River hydroelectric Power using Northwest Minerals (in four sections). Dr. Edwin T. Hodge.

   Section I. Northwest Magnesia Ores. 2 volumes, price $3.75.

   Section II. Northwest Silica Materials, 2 volumes, price $3.75.

   Section III. Northwest Limestones, 2 volumes, price $7.00.

   Section IV. Northwest Clays, 4 volumes, price $12.50.

E. T. H.

GEOLOGICAL SOCIETY SPENDS WEEKEND AT EUGENE

by Wilbur Greenup
President, Condon Club, Univ. of Oregon

Aided by the fine weather which was all the more welcome because of its uncertainty, members of the Geological Society who journeyed to Eugene the weekend of April 9th and 10th were entertained by Condon Club of the University of Oregon with a banquet, inspection of the new Oregon Museum of Natural History, and a field trip to Hobart Butte and the Goshen leaf locality.

Though the weather did not appear very favorable on Friday or on Saturday morning, there was a good turnout of the members of both groups at the banquet Saturday night, with the result that the banquet room of the Osburn Hotel was filled nearly to overflowing. Presiding as master of ceremonies was Dr. Warren D. Smith, who saw that the evening was well supplied with introductions and with jokes. Following the banquet the group met at Condon Hall where Dr. Smith and Dr. L. S. Cressman, Director of the Museum, explained the arrangement of materials in the Museum and something about the outstanding collections. Dean Packard, of the State College, then told some of the history and significance of Dr. Thomas Condon's work and of the fossils which he left to the University. Dr. Henderson, of the University Herbarium, was called on to say a few words about his acquaintance with Dr. Condon. Himself a man now well in the eighties, Dr. Henderson told how Dr. Condon once surprised him by climbing Spencer Butte and descending the extremely steep north side at the age of seventy. (It seems a marvel how long some of the scientists of the out-of-doors remain fit.) The remainder of the evening was spent in looking over the materials in the museum. It is rumored that the museum lights were finally turned out by Dr. Allison, who was driving back to Corvallis and wanted to get started.

At 8:20 Sunday morning the caravan of the Geological Society and the Condon Club members was on the way to Hobart Butte. Nineteen cars drove through the early morning sunshine and mists, and by the time Hobart Butte was in sight it was quite apparent that our trip was going to be favored by one of the finest of spring days. After stopping for a few minutes along the Coast Fork of the Willamette River near the base of the butte we drove part way up the trucking road of the Willamina Clay Products Co., then walked the rest of the way to the top. Since the grade was intended for one-way traffic, Dr. Smith turned engineering geologist and supervised the delicate process of getting the cars turned around and parked.

From the top of the butte an excellent view was afforded of the surrounding country and the valley spread out below. Black Butte, still with some snow remaining on its upper area, could be plainly seen just a short distance up the valley. But most of the time was turned to selecting some of the abundant specimens of orpiment and realgar, slickensided surfaces, carbonized wood, and the material from which the Willamina Clay Products Co. derives some of the kaolin for its refractory brick and tile products. Excellent collection specimens of all of these were found in the open workings of the brick company. The brilliant orpiment and realgar deposits make fine additions to a mineral collection, but they are of no present value commercially because the same arsenic sulphide compounds are prepared cheaply by artificial means.

After running, skidding and sliding down the south side of the butte, we drove back down to the river and ate lunch. Before eating, however, we carefully washed all real and imaginary arsenic off our hands and then ate a hearty lunch and enjoyed a clear conscience.

On the way back to Eugene we stopped at the Goshen leaf locality about two miles south of Goshen. Here a large number of leaves and other plant remains were found, many of them nearly perfect specimens. The outcrop which we examined is a type locality of the Oligocene floras of western Oregon and Washington. Paleobotanical studies indicate that the species found here are of distinctly warmer climatic types than the later floras of John Day basin or the Eagle Creek flora from the upper Oligocene of the Columbia Gorge. Specimens from the Goshen locality are shown to be similar to modern flora of sub-tropical forest areas in Central America, of central and southern China, and of the Philippines. The supposition is that western Oregon and Washington were sub-tropical during this period and that the related flora have since migrated southward to their present habitat. Chaney and Sanborn class the beds at Goshen as upper Eocene; others believe them to be of Oligocene age.

After leaving the Goshen beds some of the party stopped a short distance out of Eugene at the Springfield Junction outcrop to examine the marine Oligocene beds found there. These beds are a part of the Eugene formation which was earlier thought to be Miocene, but it is now quite definitely classed as Oligocene. A basalt dike near the eastern end of the outcrop was clearly shown cutting through the sandstone and shale beds and leaving them baked near the contact.

* REVIEWS *

The Fiord Region of East Greenland: Boyd, Louise A., (Spec. Pub. No. 18 of American Geographical Society, N.Y., 1935: 369 pp., 361 half-tones, with 10 maps and 27 panoramic photographs in supplement. Cost $4.00.)

To anyone interested in the geology of ice and development of glacial physiography, this well-bound volume is an invaluable addition to the library. To any arm-chair explorer, the superb collection of photographs will provide many a pleasant evening.

Miss Boyd gives a narrative account of expeditions headed by her to explore eastern Greenland in 1924, 1926, 1931, and 1933, and description of the vessel and equipment (surveying instruments, photographic equipment, fathometer, supplies). A chapter on the history of exploration in the region is given, by John K. Wright. J. Harlen Bretz is the author of a section on physiographic studies (pp. 160-245). Photogrammetrical work is summarized in a chapter by O. M. Miller and Walter A. Wood. Echo-sounding records are reported by Charles B. Hitchcock. Botanical work of the expedition is summarized by William B. Drew.

An adequate review of such diverse topics is out of the question in this Bulletin. The publication is recommended to anyone interested in the geology of glaciers, or in records of Arctic exploration.

K. N. P.

NEWS NOTES FROM "SCIENCE"

The following news notes have been gleaned from "Science", a weekly publication and official organ of the American Association for the Advancement of Science, vol. 87, no. 2259, April 15, 1938.

"Prehistoric Quarries and Implements of Pre-Amerindian Aspect in New Mexico", by Kirk Bryan. The article discusses the finds of geologic work in New Mexico during the past summer. Two prehistoric quarries were visited and at one of them artifacts of unexpected type were found. The pits or quarries occur on high ground, and in a bed of chalcedony, many of the artifacts were found. It is implied that peoples of unknown character, having a different and apparently non-Pueblo stone culture; lived in the area. The artifacts are described.

"The Level of the Ocean during Part of the Cenozoic Ear", by A. H. Fretz. Mr. Fretz states that there are 3 problems of the Cenozoic Era: "(a) Submarine channels on the continental shelf; (b) severe changes in climate, including a period of continental glaciation; and (c) intercontinental migration of land animals". He is more concerned with the lowering of ocean level and proposes a theory new to the reviewer. A passing heavenly body caused moisture to be drawn from the oceans, lifted to the stratosphere and assume a form like the rings of Saturn. Their center was in high northern latitude and their larger dimension parallel to the surface, and the water was frozen. This "salt hail" would fall, adding to the glaciers and the salt content would cause the glacial till to assume its characteristic flat surface. Vegetation would be killed, the bare soil taken by the wind and deposited as loess. Upon melting, the glacial water would return to the ocean and return it to its normal level. The hypothesis presented is somewhat unique, and may be worth further study. So far, no acceptable hypothesis has been presented which will satisfy all the conditions required by the submarine canyons.

"Peking Man", by Frank Thone. This item is from Science News, in the same volume of Science. The statement is made that Peking Man is one of the most primitive humans, he was more "low-browed" than Neanderthal man, he walked fully erect, and had a possible height of 5 feet 4½ inches. He could fashion rough stone tools, and knew the use of fire, and was probably a cannibal.

"The Meeting of Western Geologists", from Science News. A series of items presented at the Cordilleran Section meeting of the Geological Society of America. Development of the Sierra Nevada Mountains; a new submarine canyon, half as deep as Grand Canyon, off the California Coast has been discovered by Dr. Francis P. Shepard; Dr. Howell Williams has been doing some work on volcanology; and many others. Most of the information deals with California and should be treated more fully in the Proceedings of the G.S.A., to be published later.

R. C. T.

TRIP TO LAKE BEN MORROW AND BULL RUN HEADWORKS

Leader: Ben S. Morrow, Chief Engineer Bureau of Waterworks.

Sunday, June 12th.

Caravan assembles at the rendezvous - West 6th and Yamhill at 9:00 A.M.

The first stop will be at Mt. Tabor Reservoir where the Bull Run pipe lines discharge, for a brief talk by the leader on Portland's water system.

Stops will be made at other points of interest, among them at Lusted Hill, the scene of a serious collapse of the second pipe line while it was being tested in February 1911.

A 2-hour stop will be made at the Headworks for examination of the intake structures of the Portland water system (no fishing allowed) and points of geologic interest in the vicinity, and also for lunch.

In the afternoon the party will proceed to Bull Run Dam where the reservoir created thereby will be appropriately christened by the Geological Society of the Oregon Country,

LAKE BEN MORROW

all in conformity with the Ordinance 69308 of which the following is a copy.

Ordinance No. 69308.

An Ordinance naming the water in the reservoir created by the Bull Run Dam as "Lake Ben Morrow".

The City of Portland does ordain as follows:

Section 1. That in recognition of the eminent engineering ability of the Chief Engineer of the Bureau of Water Works, Ben S. Morrow, and as a lasting testimonial of appreciation of his services of twenty-five years in the Bureau of Water Works of this city, and particularly his achievements in the designing and construction of the Bull Run Dam, the body of water in the reservoir created by the Bull Run Dam hereby is named "Lake Ben Morrow", and hereafter said body of water shall be so designated.

Passed by the Council, Mar. 17, 1937.

Joseph K. Carson, Jr.
Mayor of the City of Portland.

Attest:

Geo. R. Funk
Auditor of the City of Portland

2/24/37
By Order of Council
Prepared-Approved
City Attorney

The christening ceremony will be in charge of the following committee: J. C. Stevens, Clarence Phillips, and Franklin Davis. Nancy Lou Combs, granddaughter of Mr. and Mrs. Stevens, will break a bottle of champagne on the dam with the words, "I christen this reservoir Lake Ben Morrow".

From the California Mining Journal, April, 1938.

The Mississippi River, with its enormous volume of water and its great drainage basin, carries quantities of eroded and corroded material to the sea. The amount represents the river's efforts to reduce the drainage basin to base level. About 340,000,000 tons of mud and silt in suspension; 136,000,000 tons in solution; 40,000,000 tons of sand rolled along the bottom. The sum total is 516,000,000 tons. To use the proverbial illustration of "things laid end to end" and the like, this material would form a body 1 mile square and 250 feet high.

This looks like a large amount of erosion each year, but when one considers the mountains, or even fair sized hills, a hill one mile square and 250 feet high is not a great amount of the total land.

* *

Petrified wood is interesting material for collectors. It may have scientific value in age dating the material in which it occurs; some revenue may be derived from the polishing of specimens; and it adds to the general bulk of the collector's material. Some petrified wood specimens have been found to contain gold, and some reports are received that run as high as $3700 per ton. Perhaps you petrified wood collectors have gold mines in your laboratories?

* *

Mining & Metallurgy for May, 1938, carries an item about the world's deepest drill hole. It has been completed by the Continental Oil Company, at a point 3½ miles west of Wasco, in Kern County, California. The final depth was 15,004 feet, slightly under 3 miles. It cost $300,000 to drill.

R. C. T.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg.,Portland,Oregon
POSTMASTER: Return Postage Guaranteed

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 12 Portland Oregon June 25 1938

Official Publication
of the

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * * *ANNOUNCEMENTS* * * * * * * * * * * * * * * *

Field Trips

Sunday June 26th	:	No trip
Week end July 2-3-4	:	Institute of Marine Biology, Coos Head, Charleston, Oregon. Members who so wish can sleep in the school dormitories, men in one and women in another. Meals can be purchased at the school dining room if we have advance information on number coming. "At Cape Arago State Park the formation is standing almost on end. It is upper Eocene in age and there is an excellent fossil collecting locality in one of the coves. At low tide there is a great variety of marine life to be seen. I am sure this will be the section to be visited on Sunday, July 3. The 'Empire' formation can be visited on the way home. It is upper Miocene in age and is the only ? upper Miocene exposure in Oregon. It is less than a mile from Charleston and the society members can get a good collection of fossils of this age in time to start for Portland by 11 A.M. if they want to start back that early. The coast highway is in excellent condition all the way down." (Letter from A. D. Vance).

Lectures

Friday June 24th	:	Mr. James Stovall, Instructor in Geography, University of Oregon, will address the Society on the subject of the Wallowa Mountains.
Friday July 8th	:	Mr. J. E. Morrison, Mining Geologist, State Dept. of Geology and Mineral Industries, will discuss mining in the Grants Pass area.
Friday July 22	:	Movies: "The Story of Sulfur".

Thursday Luncheon

L'ABBE'S FRENCH DINNERS
910 S. W. Salmon Street
(Roosevelt Hotel)

Prices are 40¢ - 45¢ - 50¢ and up.

You have your own choice. Drop in every Thursday noon. You will enjoy the fellowship and the food is good.

THE WALLOWA SUMMER CAMP

Rates are reduced

Send your request for cabin reservations to

Williamson's by the Lake
Joseph, Oregon.

The official first day of the camp is July 5th.

The rates quoted are for a period of not less than seven days.

Meals	: $1.50 per day per person.
Cabins	: Two bed rooms, two double beds, bedding furnished, $3.50 per day.
	Single room, two double beds, bedding furnished, $3.00 per day.
	Single room, two double beds, bring your own bedding, $2.50 per day.
	Camping free with meals at the dining room.

These rates are less than those listed previously and apply for any number of days that you care to stay above seven and provided you have your meals at the dining room.

A $3.00 camp charge will be collected from all non-members who are not guests of members.

State that you are with the Society in your letter for reservations.

There is still time to make your reservations. Do it now.

I want a check list of those going, so please call or write to:

H. B. Schminky
1030 S. E. 54th Ave.
Phone - TA 2485

* * * * * * * * * * * * ECHOES OF THE JOHN DAY TRIP * * * * * * * * * * * *

" June 16th, 1938

Dear Mr. Treasher:

While the happy memory of the recent trip to The Fossil Beds of Clarno are fresh in our minds we wish to thank your splendid committee and all others of the Geological Society who so generously worked for the happiness of all.

We are looking forward to another such trip, perhaps to camp on the other side of the John Day.

Am sending 'Footsteps' under separate cover. You will notice the next social meeting of 'Pathfinders' will be held in Laurelhurst Park. It is somewhat 'geological' and we invite your society to see our little show. Please read notice from 'Footsteps'. Thanks a lot.

Elmer Robarts, President of Pathfinders.

The social meeting referred to is to be held in Laurelhurst Park at 7:00 P.M. Wednesday June 29th. Meeting place is just beyond the northeast corner of the lake. "Bring your supper if you wish".

* * *

The following card has been received from the Wheelers:

"Dear friends: We have just experienced one of the most thrilling times of our lives. Dr. Boyle, Custodian, is grandest man in this world. We have received every courtesy and have been more than compensated for our long journey. Imagine trekking over Devonian, Carboniferous, Permian, Jurassic and Triassic and Cretaceous. It is beyond description, but we are well supplied with plenty of information on the whole works. Mrs. Chester Wheeler". (Leaving Dinosaur Monument, Utah, Saturday, June 11th).

* * *

The Three Musketeers reported in from the Grand Canyon. They had been down, and up, and still like it.

* * *

NEWS OF THE MEMBERS

Vacationing:

This appears to be vacation time and the Geological Society members are gathering their cars about them and trekking to new and greener fields. A. D. Vance and family are spending three weeks at Coos Bay with the Oregon State College summer camp. The Three Musketeers, Florence and Helen Iverson and Connie Enders, are seeing the Grand Canyon and way points. Mr. and Mrs. Chet Wheeler are following the trail of the dinosaur. The Ken Phillips family left for the Southwest; in fact, it seems that most of the Society is going to the Grand Canyon. Doctors Osgood, Booth, and Jones are in San Francisco at a medical meeting. J. Martin Weber is with the A. W. Hancock group in the John Day.

If the members will advise us of their vacation plans, we are all interested.

* * *

Mr. Earl K. Nixon addressed the Council of Economic and Social Research on Tuesday, June 14th, discussing the work of the Department of Geology and Mineral Industries.

Dr. Edwin T. Hodge spent several days at Kootenai Lake in British Columbia and in Montana on consulting work.

BACK NUMBERS OF GEOLOGICAL NEWS LETTER

The Society is receiving requests from libraries for copies of our News Letter and also requests for back issues to make up complete files. The reserve stock of the printing department is practically depleted, and we are anxious to secure as many back issues as possible. Will members who are not saving complete files look through their stack of News-Letters and advise us of those you would be willing to turn in?

In this way it is hoped that we can supply these libraries with the copies they desire. It is considered quite beneficial to have complete files deposited with various libraries throughout the United States. Copies not in use, or not being saved, can thus be turned in and serve a very useful purpose.

Will you look through your files? If you have extra copies of some perhaps we can trade them for others for you if you wish.

BULLETIN OF THE GEOLOGICAL SOCIETY OF AMERICA
Volume 49, number 6
June 1, 1938.

Dr. Hodge has a paper on Geology of the Lower Columbia River, 107 pp., 25 illustrations, and 12 plates.

* * *

The following bulletin is available at the State Department of Geology and Mineral Industries, 704 Lewis Building, Portland, Oregon, 45¢. Any orders should be turned in to Tracy Wade. If 20 or more are secured, a discount of 20% is allowed.

"Preliminary Report on Some of the Refractory Clays of Western Oregon": Hewitt Wilson and Ray C. Treasher, 93 pp., 48 figs., incl.maps, 1938.

The writers' abstract is as follows:

This is a preliminary report of some of the refractory clay deposits of western Oregon, prepared in cooperation with the U. S. Bureau of Mines' Northwest Experiment Station, the University of Washington, and the Oregon State Department of Geology and Mineral Industries. The economic aspects are stressed; the quality of clays with fusion of cone 30 or better are considered by means of physical and chemical tests of the clay; the estimated quantity, mining and transportation conditions are discussed; and recommendations are made for continued work. Geologic data were secured incidental to the main project, but conclusions based on these data must be considered tentative. Such conclusions are submitted as contributions to a very complex subject on which little work has been done.

The clays appear to be derivatives of flows, pyroclastics, and gravels that were predominately andesitic and rhyolitic in composition and lower Eocene to post-middle Miocene in age. Alteration was effected by descending meteoric waters and by hydrothermal solutions; similarity of the products points toward a common epoch of alteration, probably post-middle Miocene. The occurrence of gravel, so thoroughly altered that the entire mass can be cut easily with a knife, is noted in the valleys of the McKenzie and Santiam Rivers, near Sublimity east of Salem, at Fransen's clay pit west of Rainier, and in southern Lewis County, Washington. It may represent the remnant of a series of old gravel terraces.

Refractory clays are found throughout the area west of the Cascade Mountains in Oregon and are characterized by moderately high fusion, high shrinkage, and dark fired colors. Precalcination reduces shrinkage and cracking, Preliminary samples were obtained for firing-test data, and from these results four deposits were selected for additional study on the basis of quality, probable tonnage, and transportation conditions.

The first is the Fransen clay pit in northwestern Columbia County. The pit is composed of thoroughly altered gravel, has an average fusion of cone 30 plus, high shrinkage, dark fired color, 430,000 to 1,720,000 short tons available, and transportation can be handled by a 1400-foot tram line to deliver clay at railside or to ships on the Columbia River.

The second is the Ellis deposit in southwestern Clackamas County, typical of the bentonitoid Molalla clays, with an average fusion of cone 31 plus, high shrinkage and severe cracking which can be improved by calcination, 31,000 to 73,000 short tons available, and requiring a $4\frac{1}{2}$ mile truck haul to railside at Molalla.

The third is the King clay, east of Salem, which fuses at cone 32 plus to dark brown. There are 240,000 to 330,000 short tons available, and a $6\frac{1}{2}$ mile truck haul to railside at West Stayton will be necessary. This clay is unique for its original white color, large amount of water required for plasticity, large dry pore space, cracking, and high shrinkage. The area to the north seems to be underlain by similar material. The future value is for use as a plasticizer with its own calcined grog or other nonplastic refractories.

The fourth is the Hobart Butte clay quarry in southwestern Lane County, controlled by the Willamina Clay Products Co. The clay is a hard, light colored flint clay with conchoidal fracture, fusing at cone 32 plus to light colors. Tonnage is estimated in excess of 46,000,000 short tons, and a 16 mile truck haul to railside at Cottage Grove is necessary. This represents the best clay studied, and tests indicate possibilities of whiteware and a paper filler use for some of the material.

Although not refractory, a discussion of the Willamina clay is included; this black material burns to a white vitrified body at low temperatures and is used for light firing face brick and pottery and as plastic material for the Hobart Butte refractory clay.

Recommendations for future work include suggestions for thorough and systematic sampling of all deposits, research to determine a method to overcome high shrinkage, more accurate data on the uniformity of the clay deposits, and a careful study of the geology and petrography of the clay and associated rocks to determine the origin and age of the clay materials.

R. C. T.

METHODS IN COLLECTING AND PRESERVING
PALEOBOTANICAL SPECIMENS

Dr. Ethel I. Sanborn.

(An address by Dr. Ethel I. Sanborn, Professor of Botany and Paleobotany at Oregon State College, delivered before the members of the Geological Society of the Oregon Country on May 13, 1938, at Portland, Oregon; taken in shorthand by Miss Ruth Hickman).

I feel that it is quite presumptive of me to even attempt to talk to you as a geological society about methods in any field work of any division of paleontology. Many of your members are undoubtedly more expert in collecting than I and may have had much more experience in that line. However, at the suggestion of your president, I shall attempt to give you some information that may be of some help in collecting, sorting, packing, and transporting and in the identification of fossil plants. You are all aware, I believe, that my experience has been almost entirely with Tertiary plants, which we collect as leaf impressions.

Since I began to plan this talk, and to try to find recorded references to methods in paleobotanical collecting, I have been interested to see how little there is. Knowlton in his book "Plants of the Past," on pages 11-12 takes up the subject "How to Collect Fossil Plants"; and in the recent publication, "Methods in Paleontology" by Camp and Hanna, there are about three pages, the larger portion of which deals with special parts as carbonized twigs, cones, and seeds of grasses. In the beginning of this section Camp says, "The collecting of fossil leaves may require no special precautions".

It is possible that some of you may hope that I may be able to tell you of some method by which a fossil leaf may be removed as a perfect fossil specimen. I only wish I knew of such a method - if there were, the time spent by paleobotanists in the determination of their collections would undoubtedly be shortened - or perhaps, it might be better to say, we would be able to make many more determinations in the same amount of time.

1. Tools or implements.

As stated by Knowlton in his book "Plants of the Past", "The implements needed in collecting fossil plants are few and simple". The most essential implement is the geological hammer; a pack, a bar, or both, and one or more stout cold chisels should be included, as the collector is really handicapped without them. Some suggest a hammer with a square-faced steel head on one side and on the other a thin cutting edge as the most efficient. The cutting edge would be useful in many ways. My experience has been with a hammer with a hexagonal head and a pick on the other edge. It is apparent that the thin blade or cutting edge would be most efficient in splitting the more compact rocks. However, I have seen the pick end of a hammer used for such purposes very successfully.

There needs be little said about the uses of the pick and bar for loosening the rocks; I do feel, however, that sometimes we are too inclined to use these instruments before having examined the plant-bearing matrix carefully enough and before cutting or attempting to cut around the pieces we wish to remove, so that in the haste and possible excitement pieces are frequently cracked and broken needlessly. The cold chisels are of use after the pieces of rock have been removed and are to be split along the bedding planes in which the leaves occur. This may be done by inserting one, two or more chisels of the same or different sizes; Dr. Chaney has some special chisels made with blades 2 or 3 inches in width which are very efficient for this work. I was interested to note a cut of this type of chisel shown by Dr. Camp in his figures of picks (Fig. 4 f) in his recent publication and then on page 72 he refers to this instrument again when speaking of splitting rocks with plant impressions, saying "Chaney employs a broad spadelike chisel". Chisels are also of special use when preparing the rocks during the preliminary examination and the preparation for packing since it is well to remove all possible extra weight before the specimens are packed for removal to the laboratory.

2. Methods in the field.

In the discussion above it has been almost impossible not to hint about some of the items to be taken up here. Field methods to be employed will vary somewhat as to the position in which the fossil leaves occur, and this is usually in one or the other of two ways.

(a) The exppsure is found in a road cut, or in the bank of a creek, where you find a longitudinal cut through the beds. If the plant-bearing strata are near the surface, it may be possible to remove the soil and other materials from above and thus have the fossils on a horizontal or sloping surface. But if too far down it may be possible to tunnel in from below or even from above. My experience has proven it will be best to try both approaches. We usually feel that we are most successful in securing the leaves intact when we can get in from above. On Crabtree Creek where the leaves were in an exposure cut through by the river, the owner of the land gave us permission to put in a charge of dynamite, and in this way we were able to secure much better collections than could possibly have been done otherwise. Even so, there were many leaves which we wished might have been secured in more perfect condition. The dynamite had no respect for a leaf impression! But we did secure many more leaves than we could have without the dynamite.

To get to the Crabtree location, go down the Pacific Highway to Jefferson; turn to left on road and go about as far as Scio, then turn off on a road to Roaring River fish hatchery. When possibly 5 miles from Scio you pass a school house, then soon come to the house of a man named Costello. To reach the plant beds go past the back door of his house to the creek, which you cross and follow down to the leaves. We have done enough collecting there with the use of dynamite to expose many of them.

(b) The second type of exposures is found where the fossil bearing strata may be lying horizontally or nearly so with the land surface and at no great depth, or at the base of a stream bed, as the West Branch Creek near Mitchell and East Birch Creek near Pilot Rock. In such instances, after the surface soil is removed, if the fossil-bearing area is not too large or the matrix too fragile, sections may be pried up with the hammer or pick; but if the area is too large or the matrix too fragile, cut around the section with the cutting or pick edge of the hammer before lifting or attempting to pry up. If on your recent trip to the Goshen beds you had gone a few feet to the northeast on the low hill you would have been able to secure some of the fossil plant impressions in this way rather than tunnelling in as you did from the roadway. You may be interested to know that practically all of the collections for the study of the Goshen flora were made from the material which had been removed by the workers in building the highway, so when we made our collection we could go down and pick up the rocks by the roadside; many times finding the leaves exposed, other times finding many more by splitting some of the larger pieces.

3. Sorting.

This is frequently a difficult task, for it is usually hard to leave any of the specimens behind; I believe we are all perhaps inclined to keep everything with a fairly clear organic impression and then find we have much around that is really of little value from the scientific standpoint. When removing materials it is well to place all that is taken out which may be of any value off to one side well away from the digging operations. Do not pile, as this is apt to scratch or otherwise injure the specimens. Then when you have completed the removal, sort out, putting those which are, or you believe to be, of the same leaf together, so you will have as many groups as you have species of leaves. Finally to over each of these groups keeping the best specimens of each supposed species. Also, if you seem to have very little of one do not throw that away as further splitting of the rocks may bring out other specimens. When you do not have leaves entire, it is well to keep any tips and bases which are especially well preserved; also any sections of the middle portion of leaves which show the margins clearly. These features, the margin, the tip and the base of a leaf, are frequently very important characters in leaf determinations.

4. Packing.

Be sure to have plenty of newspapers, with soft tissue paper for the more delicate specimens. Wrap each piece separately, then if several pieces that belong to one species or a single leaf that has been broken, these may all be wrapped in a larger bundle together. Unless the material is very "crumbly" the use of shellac should be avoided.

The discussion so far may really all be considered field work; and now I will take up some discussion of the laboratory methods.

5. Laboratory methods.

This is the portion of paleobotanical work and study that take the most time - and is often the most discouraging.

(a) Tools. Many of the specimens after being brought into the laboratory need to be chiseled out to expose parts which are covered. For such purposes a small hammer and cold chisels of various sizes are desirable. And, for this type of "excavating" many of the instruments discarded by dentists are very efficient. These are especially good for the finer details as where one wishes to expose the teeth along the margin. Caution must always be taken that you do not gouge out pieces of the specimens you are trying to uncover, for it is very easy to hit the end of the chisel so forcibly that it not only removes the matrix covering the leaf, but as well bits of the leaf. Heavy canvas bags, approximately 12 by 18 inches, well filled with sand should be used as cushions on which the rocks rest during this part of the work. These, it seems to me, are much more satisfactory for this work than a sand table, for they can be easily removed from place to place when working. Just get your canvas, stitch up the bag, fill it with sand and either tie or sew at the end.

(b) <u>Identification</u>.

For this part of paleobotanical study we have no way in which we can be assured of locating our leaves exactly as to genus and species. It is really a case of trial and error -- the first thing to do is to study the fossil impressions very carefully. If you have two or more impressions which seem to you to be of the same species, make detailed study of each, noting any variations you may find.

Shape: Note the general shape of the leaf, the base, and the apex. Is the impression symmetrical or asymmetrical? Is the margin entire or toothed? If toothed are the teeth close or well-spaced, and do the tips of the teeth point upward or outward?

Venation: If palmately veined, count the veins which arise from the top of the peticle. What are the angles between these spreading primary veins? Is there any forking of these veins during their course through the blade?

If pinnately veined - notice whether or not the midrib is straight, and whether of same thickness throughout the blade. The number of secondaries, the angles at which they leave the midrib, and their direction through the blade, as they approach the margin, are often generic characteristics. In some leaves these veins leave at broad angles, and curve little as they approach the margin, where they may extend into teeth; others may have the same general direction, but will unite to the one above in a single arch or series of arches, and then if a toothed leaf, small branches arise from the arches and enter the teeth. Or if it has an entire margin the secondaries may become so weak near the margin that they are obscure in this area of the blade. The type of the finer nervation must be noted, and the angles at which these veins leave the secondaries. The texture of a leaf is another important feature, - generally leaves may be classed as leathery or coriaceous, firm or subcoriaceous, membranous, thin.

These are a few of the details of a fossil leaf which must be noted and as one attempts to make identifications, other features will be observed.

As you study a leaf impression, try to think of it in relation to leaves of the living plants, with which you are familiar especially those of trees and shrubs as these are the types more adapted to fossilization. It is well, for any one who is interested in the study of fossil leaves, to make careful observations of the leaves of our living flora. Do not stop with a single leaf but study the variations you find on a single branch, and the variations you will find are frequently of a relatively wide range.

Then when, if you do, find leaves of a living tree or shrub that suggests your fossil, try to see what records you may find of the genus in described fossil floras. Study the illustrations, and descriptions of the various species of the genus. This is one type of study in which we may very profitably spend considerable time looking at pictures. If one has access to a herbarium, it is an aid to make comparisons with your fossil leaf with any in the herbarium collections. These comparisons are especially valuable if the herbarium has sheets with specimens of the genus from other locations, which are quite distant from that in which we live. Or, if you are really interested in fossils, you will find it of value, to make a pressed collection of your own.

I hope I have been able to give you some information which you may find helpful in your collection and study of the Oregon fossil flora, and shall be very happy now to attempt to answer any questions you may wish to ask.

* * *

"Oregon: Geologic and Wild Flower Wonderland"; Warren D. Smith and Helen Gilkey, 16 pp., colored plates, 1938. Released by the Travel and Information Dept., Oregon State Highway Commission, Salem, Oregon.

This travelogue by Dr. Smith is a beautifully written discussion of the main gelogic features that may be seen along Oregon highways. There are many black and white pictures and excellent color reproductions of Mt. Hood and Crater Lake. Dr. Gilkey's description of the principal flowers is excellent, and there are many colored cuts. A print of a relief map of Oregon is included. Copies may be obtained by writing the State Highway Commission.

R. C. T.

LAKE BEN MORROW TRIP
June 12, 1938
Ben Morrow, Leader.

The trip to Lake Ben Morrow, led by Mr. Ben Morrow, Chief Engineer and Manager of the Portland Water Bureau, was one of the largest trips ever scheduled. Forty-seven cars carried over 150 people past Mount Tabor reservoir, Dodge Park, and the Headworks, to Lake Ben Morrow. Members of the American Society of Civil Engineers, the Mayor and City Commissioners, and other dignitaries were invited.

The occasion was an inspection of the Portland water system, and through the thoughtfulness of Doctor J. C. (Jack) Stevens, the Society performed a dedication ceremony at the Lake to officially recognize Ordinance No. 69308 naming the lake, Lake Ben Morrow.

First stop was at the reservoir at Mount Tabor, where Mr. Morrow explained the details of water distribution. These data are given in Mr. Morrow's write-up of the trip. From here, the caravan went out the Base Line road to the Twelve-Mile House, then to Gresham and to Dodge Park via the Lusted Road.

A stop at the bridge over the Sandy at Dodge Park was made for Mr. Morrow to explain some of the features of the pipeline construction. He pointed out that the bridge was one span of the old Burnside bridge from Portland, given by the Commissioners to Clackamas County.

The trip was continued with no stops until the picnic grounds at the Headworks was reached. Already cries of "when do we eat" were arising from various parts of the caravan, and the noon stop was a very enjoyable one. The good-fellowship of mealtime overcame the dust hazards of the last few miles and it was 1:30 before the party moved up to the Headworks.

The big occasion was at the Bear Creek damsite, where the Bull Run dam is constructed and Lake Ben Morrow formed. Commissioner Clyde had the structure festively decorated with flags and bunting, and the sight of the be-ribboned bottle of champagne was a sight to certain sore eyes. Mr. Morrow further explained the "upper end" of the water system, after which Mr. Stevens took charge of the ceremonies.

The Society is grateful to Mr. Morrow for the interesting trip he had prepared, and to Mr. Stevens and his committee, Clarence Phillips and Franklin Davis, for the dedication ceremony. A more detailed description of certain phases of the trip appears elsewhere in this issue.

Mrs. R. C. T.

LAKE BEN MORROW

was appropriately christened by the Geological Society June 12th. The entire party, some 150, gathered on the top of the dam for the ceremony. After Mr. Morrow had given the history and the purpose of Bull Run Dam the meeting was turned over to J. C. Stevens, chairman of the christening committee.

W. G. Brown, past President of the Oregon Section American Society of Civil Engineers, reminisced most interestingly on the early work of bringing to Portland the excellent water from Bull Run River. Much of the system took shape under D. D. Clarke who was connected with it 1893 to 1923.

Present also was Wm. D. Clarke, son of D. D. Clarke, who continued in a reminiscent vein. He began his engineering career as a rodman for W. G. Brown on the surveys of the first pipe line, when he was 13 years old. He also spoke of the excellent work Mr. Morrow had done since his connection with the system.

R. E. Koon, trustee Pacific Northwest Waterworks Association, paid a splendid tribute to Ben Morrow, mentioning his connection with the Association, and particularly with the Portland water system.

Mr. Stevens then briefly outlined Mr. Morrow's professional career. He got his engineering training at Stanford, his early experiences with Stone and Webster on the Electron hydroelectrical plant on Puyallup River, with the Willamette Iron Works, and the U. S. Geological Survey. He began his service with the Portland water system in 1909 and has continued therein to the present time, first as draughtsman, then assistant engineer, then chief engineer, and now with the title Chief Engineer and General Manager. The works with which he has been intimately connected and in responsible charge were the 2nd and 3rd pipe lines, the Headworks, the four Willamette River crossings, the Vernon supply line, and finally and most important, the Bull Run Storage Dam.

The reservoir created by this dam was officially named in his honor "Lake Ben Morrow" by ordinance No. 69308 of the City Council passed March 17, 1937, which states:

> "That in recognition of the eminent engineering ability of the Chief Engineer of the Bureau of Water Works, Ben S. Morrow, and as a lasting testimonial of appreciation of his services of twenty-five years in the Bureau of Water Works of this city, and particularly his achievements in the designing and construction of the Bull Run Dam, the body of water in the reservoir created by the Bull Run Dam hereby is named 'Lake Ben Morrow', and hereafter said body of water shall be so designated".

Nancy Lou Combs, granddaughter of Mr. and Mrs. Stevens, actually performed the christening ceremony. With the words, "I christen this reservoir Lake Ben Morrow," she broke a bottle of champagne against the parapet of the dam.

Commissioner Ralph C. Clyde is to be especially commended for having the dam most appropriately decorated in flags and bunting for the occasion.

Ben stood in the crowd silent and quite moved by it all. It was a fitting tribute to a man of splendid achievements, and the Geological Society may well take the credit of putting it over.

J. C. S.

PORTLAND'S MUNICIPALLY-OWNED WATER SYSTEM

Ben S. Morrow.

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. 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 amountain. 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 $3\frac{1}{8}$ 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:

Content	Parts per million
Total dissolved solids	30
Silica (SiO_2)	9
Iron (Fe)	0.03
Calcium (Ca)	2.7
Magnesium (Mg)	0.5
Sodium (Na)	3.1
Potassium (K)	0.5
Bicarbonate (HCO_3)	12.0
Sulfate (SO_4)	3.1
Chloride (Cl)	1.3
Nitrate (NO_3)	0.31
Total Hardness as $CaCO_3$	8.8

Ralph C. Clyde
Commissioner of Public Utilities

* * *

REPORT OF SERVICE COMMITTEE

Publications of the University of Oregon Press may be purchased through the Service Committee at substantial discounts by society members.

Following is a list of Geological and Geographical bulletins available.

		List Price
Dixon	Bibliography of the Geology of Oregon	$1.00
	Guide to Condon Geological Museum and prospectus of the Department of Geology	.25
Hanna	Fossil Freshwater Mollusks from Oregon Contained in the Condon Museum	.25
Hanna	Fossil Mollusks from the John Day Basin Contained in the Condon Museum	.25
Henderson and Winstanley:		
	Bibliograph of the Geology, etc., of Oregon	.25
Hodge	Geological Map of North Central Oregon	1.00
Hodge	Mount Multnomah, Ancient Ancestor of the Three Sisters	1.00
Hodge	A Proposed Classification of Igneous Rocks	1.00
Hodge	A Quantitative Mineralogical and Chemical Classification of Igneous Rocks	1.25
Hodge	Topographic Map of North Central Oregon	.25
Lupher and Packard:		
	The Jurassic and Cretaceous Rudistids of Oregon	.50
McCornack	Contributions to the Pleistocene History of Oregon	2.50
Mitchell	Minerals of Oregon	.50
Packard	An Aberrant Oyster from the Oregon Eocene	.50
Packard	The Trigoniae from the Pacific Coast	1.00
Smith	Earthquakes in Oregon	.25
Smith	Salient Features of the Geology of the Oregon Cascades	.25
Smith and Others:		
	Physical and Economic Geography of Oregon (serially in Commonwealth Review) Complete set, 7 numbers	2.00
Smith and Packard:		
	Salient Features of the Geolgy of Oregon	.25
Smith and Swartzlow:		
	Mount Mazama; Explosion or Collapse	.25

Members wanting copies of the above publications order on memorandum from Tracy Wade, Chairman.

Tracy Wade.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg.,Portland,Oregon
POSTMASTER: Return Postage Guaranteed

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 12 Portland Oregon July 10, 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

EDITOR:

Edwin T. Hodge,
2915 N.W.Luray Terrace,
Portland, Oregon.

BUSINESS MANAGER

Raymond L. Baldwin
2725 N.E. 50th Avenue
Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * * *

Lectures.

Friday July 8th : Dr. Lawrence Gould will lecture on his experiences in the Antarctic. Dr. Gould was the geologist with the Byrd expedition and is the first man to bring back any authoritative data on the geology of the region. It is a real treat and a rare opportunity to hear him speak. The lecture will be illustrated.

Friday July 22d : Motion pictures, "The Story of Sulfur", 2 reels depicting the methods of extracting sulfur in the Texas field. These films are prepared by the U. S. Bureau of Mines, and are authoritative. Time may also permit some reports of the Wallowa summer camp.

Friday Aug. 12 : Picnic. The Society will remember the wonderful time had by all, at last year's affair. Arrangements are in charge of the Social Committee. Full particulars later.

Friday Aug. 26th : Motion pictures, "The Story of Asbestos," 1 reel, and "From Mountain to Cement Sack", 1 reel. These films are prepared by the U. S. Bureau of Mines.

Field Trips

Sunday July 10th : Our trip committee chairman, Chet Wheeler, is still on vacation, but it is expected he will have something lined up for the date. Particulars will be given at the Thursday luncheon and the lecture on Friday.

Luncheon Notes

Those of you who have not been attending the luncheon at L'Abbe on Thursday noons are really missing something. Attendance is holding up remarkably, in spite of the vacation season. Last Thursday, June 30th, Dr. Lawrence Gould and Dr. Leith were among our guests. See you next Thursday noon, 9th and Salmon. You may order from the regular menu and prices range from 40¢ up.

Vacations

Mr. and Mrs. Tom Carney are touring the vacation-West. Yellowstone, Bryce, Zion and many other colorful spots are included in their plans.

The Three Musketeers are back! Two weeks, hundreds of feet of film, plenty of food, - and they are now prepared to discuss the beauties of our Southwest in verse and song.

The Kenneth Phillips family told off over 5000 miles on their trip through the Southwest, including Old Mexico. Ken says that as soon as he has an opportunity to catch his breath he may be able to tell about it.

Our V.P., Russ Collins, and family have been worrying the clams and crabs at Newport Beach. Russ should have a swell collection of fossils when he returns.

A. D. Vance reports that all is well at Coos Head. The Vance family is taking in part of the O.S.C. Biology School at Coos Head, and Mr. Vance is working with Dr. Packard.

* * * *

The Geology Summer Camp in the Wallowas is on its way! The party set sail last Saturday and the affair officially opens July 5th. They can be reached at Williamson's, Wallowa Lake. Mr. Schminky has spent a large amount of time preparing this summer camp and knowing his thorough way of working out preparations, the Camp will be a real treat. Society members and their guests are welcome to join the party.

* * * *

Director Earl K. Nixon and Arthur M. Swartley of the State Department of Geology & Mineral Industries, accompanied by Dr. Warren D. Smith, spent the week end at Baker. They appeared on the program of the Baker Mining Convention. Mr. Nixon discussed "Mining and Stream Pollution"; Mr. Swartley talked about the resources of the Baker region; and Dr. Smith considered "World Minerals and World Politics".

* * * *

A recent publication of Warren D. Smith, with the collaboration of Margaret Ray, has come to the attention of the News Letter. "Geological and Geographic Elements in the Willamette Valley Project", from the Commonwealth Review, vol. 20, no. 2, May 1938.

* * * *

The State Department of Geology & Mineral Industries announces its Bulletin no. 8, "Feasibility of an Iron & Steel Plant in the Lower Columbia Area near Portland", by Raymond Miller. An abstract will be given later. The price is 40¢; copies may be seen in the public library or at the office of the Department, 704 Lewis Bldg. Leave your orders with Tracy Wade; the Society receives a 20% discount when the bulletins are obtained in lots of 20 or more.

* * * *

(Editor's Note): Your attention is called to the article in this issue by Carl Price Richards, based on his photograph of the eclipse of the moon. This is truly an unusual picture and the Society is grateful to Mr. Richards for permission to publish it. Reprints of this article are available if members want them, with the photograph unfolded, for 15¢ postpaid.

v. Q

THE EXPLORATION OF THE OREGON CITY HIGHLANDS
March 13, 1938.

H. B. Schminky, Leader.

The trip into the highlands to the east of Oregon City was purely explorational. The leader had made one flying trip through the region, and had found so much to interest him that it was hard to fix a route for the caravan. However, twenty hardy geologists seemed willing to follow him when the caravan left the regular meeting place. The area visited by the party lies between the Clackamas river, the Willamette river, the Molalla river and its tributary, Milk creek, and the foothills of the Cascades.

The first stop on the trip was at the falls viewpoint in Oregon City. Two theories on the formation of the canyon through which the Willamette flows were discussed:

J. S. Diller states that in the early Pleistocene a fracture occurred in the basalts near Oregon City. The rock west of this fracture lifted as a tilted block, with its hinge in the vicinity of New Era. The Willamette was able to maintain its channel almost as fast as the land rose. The Tualatin, which had its channel through Oswego, could not compete with the uplift and was forced to flow along the hinge line to find a new outlet. There was a damming of the Willamette valley during the uplift. The falls have retreated about a mile since then.

Dr. E. T. Hodge is of the opinion that the basalts had been buried by sediments. Some ancient stream meandering over the sediments, found itself superimposed on the basalts as its channel was deepened, and continued to cut into them.

Neither Ray Treasher nor Jack Ross would go on record for either theory. The hanging valleys of the Tualatin river, Beaver creek at Oswego Lake, and the falls in the Willamette would seem to suppose the uplift theory. No remnants of sedimentary beds were found within the limits of the Willamette water gap on the scouting trip or on this trip.

About a mile south of the viewpoint, highway cuts reveal the structure of the bluff above the roadbed. Several feet of a poorly jointed old lava flow are exposed. The surface of the flow is more or less irregular, giving a suggestion of previous erosion. Overlying it is a layer of volcanic ash, that received much attention from the party. Jack Ross stated that it might suggest a "cut and fill". Ray Treasher was interested from the clay standpoint. Above this bed are flows of lavas that show columnar jointing to the top of the bluff and are visible along the highway from Oregon City to the Molalla river.

The caravan paused at Coalco to view a large basalt rock that is balanced on a smaller basalt column, at the top of the bluff. The unanswered question of the day was - "Could this rock have remained in place during an uplift of the land?" There is an unconfirmed story that the Indians used this rock as a landmark for a council place between tribes.

New Era was the next stop, where we visited the dam of the New Era Flouring Mill. Two very formidable signs greeted us at the gate - "Strictly Fishing are not Alloed on Private Place. No Trespass. Only on Business. Joe Seveik. New Era Flouring Mill". "Strickley Fishing are Not Alloed". Some very fast talking on the part of the leader finally gained permission for the party to proceed to the dam. But the owner's sister - a pioneer of Covered Wagon days - followed us and kept a sharp watch on all our moves. The outcrop we viewed was well worth the effort of getting in, and it is still in the "FRDK (funny rock, don't know)" class. It could be a lava that has weathered into clay or a cemented tuff that is turning to clay. The main mass is yellow in color, but scattered through it are spherical pockets of blue clay. These pockets range from a few inches in diameter to more than a foot. Solid rock is exposed in the falls of Beaver creek just a short distance away and at practically the same elevation.

South of the bridge over Beaver creek, a narrow and rather steep road climbs the bluff east of the Pacific highway, and this the caravan followed. A left turn at the top of the bluff and then a turn to the right brought us along the south side of Beaver creek valley east of the mill pond. A rather deep canyon was crossed where Parrott creek enters Beaver creek. No sedimentary material was noted in this area. The road comes out on the divide between the two streams. A stop was made to note the appearance of old age suggested by the topography. It was pointed out that both streams are entrenched in their main valleys. Ray Treasher pointed out the fact that the floor of the higher valleys was about 200 feet above the Willamette valley which corresponds to many of the terrace heights along the Columbia and Willamette rivers. It was also suggested that the higher ground might fit in with the terraces at an elevation of 500 feet. The leader's reaction to this high level terrace suggestion came "after the trip" and as a result of having to review the whole trip for this article; namely, that there was no evidence of sedimentary material to suggest a terrace formation at the higher elevations. However, the terrace may be erosional rather than constructional.

About a mile and a half from New Era, the caravan turned north for half a mile on a cross road that descended into the Beaver creek valley, then turned east along the valley. At this point we noted new stream patterns that were being cut in the floor of the higher valley. The valley was followed eastward for a mile and a half to the junction of a north and south road and here the south turn was made. This road leads to the town of Beaver Creek and crosses the highlands area. The party had been told to note the shallow soil of this region as revealed in the road cuts or by volcanic rocks plowed out by the farmers. One stop was made to examine some of this rock which proved to be a light colored felsite. Ray Treasher called attention to the concentration of moisture along hairline cracks in some of the rocks that had been broken. This stop also furnished a wide view of the horizon, making it easy to understand why the peneplain theory had been applied to the country west of the Cascades by early geologists, for all the hills seemed to rise to a uniform height when viewed from a distance.

The Oregon-City-Molalla road was crossed and the party soon found themselves in the town of Beaver Creek. The main road continues east from the town, and after about four and one-half miles, crosses a shallow valley. On the south side of this valley, at the left of a sharp turn in the road, are some fine bedded silts which gave our geologist something to puzzle over. It was suggested that there might be altered tuffs, but would not commit themselves further as to their origin. These beds are rather colorful as the different layers are various shades of browns and yellows.

After passing Clarks, the road follows for several miles along the rim of the highlands overlooking the valley of Mill creek. Lava rock was still noted in the road cuts and the rocks piled along the fences in the cultivated lands. The final descent to the valley is rather steep, and about half way down the road cuts through a series of sedimentary deposits, with iron caps overlying some of the more impervious layers. The geologists agreed that these beds were terrace remnants, and that they had probably been laid down by an eddy in the stream.

At the foot of the hill is the Meadowbrook school, where the caravan paused for lunch. A review of the trip was made for general discussion. Louis Oberson was called upon for the identification of plants and birds seen around the school grounds. After lunch the party was soon on the main highway leading through Colton to Estacada.

A stop was made at the bridge over Canyon creek, just east of Colton, where felsites, tuffs, and agglomerates are exposed. The highway hugs Milk creek for several miles before crossing the divide into Clear creek and road cuts revealed a hodgepodge of materials. Lavas, gravels, sands and silts, tuffs, and agglomerates appear in all sorts of relationships. A stop was made about two miles from Canyon Creek to examine one of these cuts. Our "fossil hound", A. W. Hancock, was attracted by a bed of fine silts, where, after a little prospecting, he was rewarded by a fossil sprig of redwood. Other types of leaves were found in rapid succession as the rest of the party "fell to" on the digging. The Society had discovered a new fossil locality. The material in which the leaves are found crumbles away on drying, so the bed is not of interest to the specimen collector, but should yield valuable data to the research worker. The section should be studied by a competent paleobotanist before haphazard digging is carried farther.

What little schedule the leader had for the caravan was shot by the finding of the leaves, so the stop at the Clear creek bridge was rather hurried. Here cemented beds of gravels, sands, boulders, and tuffs were remindful of the beds along the Sandy river at Troutdale.

The road comes out on the gravel terrace along the south side of the Clackamas river. Here the last stop was made to view the divide between the Clackamas river and Clear creek. It was pointed out that the Clackamas could have overflowed not only this divide, but also the Clear creek-Milk creek divide, when it was flowing at the elevation of the gravel surface on which the caravan had stopped. It was also pointed out that this gravel did not extend south of Clear creek, so far as the leader had discovered on his preliminary exploration of the trip. The caravan was disbanded at this stop as it was too late to follow the remainder of the itinerary through the Clear creek and Abernathy creek valleys back of Oregon City.

As a summary of the trip we offer the following:

1. The Willamette river exposes lavas of at least two different ages at Oregon City. The older one had probably undergone considerable weathering before the more recent flows occurred. A bed of ashes had been laid down over the old land surface before the last flows came. These later flows may have all come from Highland Butte or some similar vent. The so-called highlands probably owe their slope to the initial dip of these flows.

2. The only sedimentary deposits seen on the trip seem to have been laid down on the flanks of these lavas and do not overlie them.

3. This trip did not yield enough evidence to prove if the uplift that caused the falls in the Willamette was due to folding, faulting, or both. There was nothing to show if the sedimentary deposits came before or after the uplift.

4. There are still many things to study in this area. The roads traversing it are good all the year, so that anyone who wishes to do more exploring can do so at will.

H. B. Schminky.

* * * *

AN APPRECIATION.

Word has just been received that Harold Newbold Lawrie died in Washington on May 20th, at the age of 55.

Mr. Lawrie will be remembered by many as the first Chairman of the Oregon Bureau of Mines and Geology, and who remained chairman of this board until his removal to New York and Washington. He had considerable property interests in the Northwest and was a consulting mining engineer for various concerns. While making an examination of a mining property on Vancouver Island he was injured and thereafter was unable to do such work, and became a consulting economist and an authority on gold and silver in their relation and importance in world economy.

He was born in New York City and was an alumnus of Columbia School of Mines, of the class of '05. He was formerly economic adviser to the United States Senate Commission, and an author upon silver in the various editions of "Mineral Industries" since 1928. He contributed numerous articles on gold and silver to technical publications, including the Engineering and Mining Journal.

Mr. Lawrie had a keen mind, was resourceful, cultivated, always ready to aid his friends, public-spirited to a high degree. His passing is a matter of profound regret to his many friends in Portland and the Northwest.

A. M. Swartley

TOTAL ECLIPSE OF THE MOON, MAY 13-14, 1938

Some notes on a photographic record of it.

By Carl Price Richards.

The accompanying photograph is of interest as a special case in photography as well as for the information it gives as to what happens during a total eclipse of the Moon.

The main photographic problem was to determine the amount of exposure to give and, in this case, the exposures actually given were in the nature of a gamble. The results, however, will help greatly in guiding one as to the proper exposures to give in similar cases in the future.

From the table it will be seen that exposures Nos. 16 to 19, taken during the total phase, were 180 times those taken at the start and finish. It is evident that they were excessive, even in view of the ruddy light of the Moon's disc when total, as is shown by the relative brightness of those images compared with those taken earlier and later during the eclipse.

The Weston Light Meter failed to show any reading, hence the amount of exposure to give was a matter of judgment. As a result of the experience of this picture the suggestion is made that for super sensitive panchromatic film an exposure of 1/10 sec. at f-11 be given from the start and until the disc is 80 or 90 per cent eclipsed. At that time the details of the surface in shadow begins to show, so, to record that surface, longer exposures are necessary until the total phase is reached, when 1 second at f 4.5 should be about correct.

To appreciate the astronomical aspects of this photograph - or, more correctly, series of photographs - a few facts should be kept in mind.

An eclipse of the Moon is due to the Moon, a dark body, passing through a shadow cast into space due to the obstruction of the Sun's rays by the Earth. (Fig. 1). This shadow has the form of a very slender cone, the base of which is the diameter of the Earth (7913 miles) and the apex about 860,000 miles distant from the Earth, a ratio of base to height of approximately 1 to 108. At the distance that the Moon is from the Earth, 240,000 miles, this cone has a diameter of about 5,700 miles, hence it is a disc of shadow of this size through which the Moon, whose diameter is 2,163 miles, passes during an eclipse. (Fig. 2). When the path of the Moon is across the diameter of this disc, the eclipse has the greatest duration; the maximum possible, when all conditions are most favorable, being 2 hours 10 minutes. The time of totality becomes less the farther the path of the Moon is from the center of the shadow cone.

Other conditions which affect the duration of an eclipse are the distances of the Earth from the Sun and the Moon from the Earth. The longest eclipse can occur when the Earth is most distant from the Sun and the Moon, at the same time, is closest to the Earth. Under such conditions the shadow cone is longest and the Moon passes through it closer to the base of the cone, where it is of greater diameter than it is farther away. A partial eclipse occurs when only part of the disc of the Moon enters the Earth's shadow.

In the case of the eclipse of May 13, a study of the photograph shows that the Moon passed through the lower part of the shadow disc. To comprehend this one must keep in mind that the movement and rotation of bodies in the solar system is in an anti-clockwise direction when regarded from "above", i.e. from the direction of the north pole star. All the planets revolve about the Sun and all the satellites about their respective planets in that direction and, where axial rotation is observable, that also is in the same direction. A little contemplation of this fact will show that the Moon actually moves across the sky from west to east, although its apparent motion, due to the Earth's rotation on its axis, is from east to west. Hence the left (or east) side of the Moon enters the right (or west) side of the shadow, as shown in Fig.2.

If the contact had been at the horizontal diameter of the shadow, the shadow line across the Moon's face would have been vertical, but the photograph shows it inclined about 60 degrees downward to the left, showing clearly that the contact was below the horizontal diameter of the shadow cone. Note also that, as the Moon leaves the shadow, the shadow line across its face is inclined the same amount, but in the opposite direction.

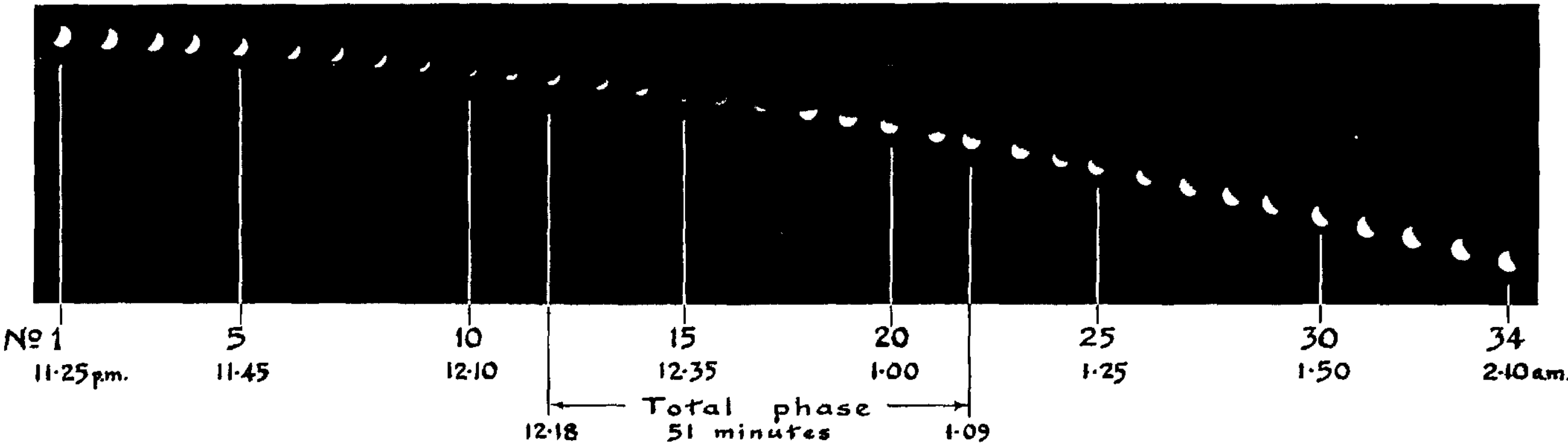
Observers of this eclipse noted during the total phase that the lower edge of the Moon was moderately bright, though obviously in complete shadow. The photograph also shows this to have been the case. This feature was due to the bending of the Sun's rays through the Earth's atmosphere; it is common to a more or less degree in most total eclipses of the Moon. The coppery color of the main area of the Moon during totality is due to the same cause.

The experience of taking this composite photograph, making an exposure every 5 minutes for nearly 3 hours in the middle of the night, with the camera set up on the roof of a downtown apartment building, was a most delightful and interesting one. The night was calm and mild, with occasional fleecy clouds floating lazily in the gradually varying silvery light. Then came the total phase, with its delicate coloring and with markings of certain lunar features still visible, all presented in an eerie light and in a stillness broken only by the weird cry of some bird. It was a scene of entrancing beauty.

One's thoughts wandered too, to the majesty of the spectacle and to the proportions of the picture being presented. Sun, Earth, Moon, - each playing its part with infinite exactitude, yet on a scale which encompassed millions of miles. There was also the further thought that man, infinitesimal in the physical scale, had acquired a thorough comprehension of the event and had so mastered the mechanics and mathematics of the phenomenon that he had predicted the times of the various phases of the eclipse to the fraction of a second.

Yes, there was much to think about and to fascinate one during those three most enjoyable hours, spent alone on the roof in the middle of the night!

(Editor's Note: Photo taken with Kodak Six-20, f 4:5, compur shutter, S.S. Pan.film, $2\frac{1}{4}$x$3\frac{1}{4}$, on one film, exposures at 5 min. intervals).



TOTAL ECLIPSE OF THE MOON, MAY 13-14, 1938.

Photographic record made by exposing one film in a fixed camera at five-minute intervals throughout the main part of the eclipse.

Following are the particulars regarding each individual exposure:-

No.	Time P.S.T.	Stop	Speed	Remarks
1	11.25 p.m.	f8	1/10 sec.	Clear
2	11.30 p.m.	f8	1/10 sec.	Clear
3	11.35 p.m.	f8	1/10 sec.	Light clouds
4	11.40 p.m.	f8	1/10 sec.	Clear
5	11.45 p.m.	f8	1/10 sec.	Clear
6	11.50 p.m.	f7	1/10 sec.	Light clouds over disc.
7	11.55 p.m.	f7	1/10 sec.	Clear
8	12.00 m.	f6	1/10 sec.	Clear
9	12.05 a.m.	f6	1/10 sec.	Very light fleecy clouds
10	12.10 a.m.	f5.6	½ sec.	Cloudy, hardly visible
11	12.15 a.m.	f4.5	1 sec.	Slight clouds.
12	12.20 a.m.	f.4.5	1 sec.	Clear
13	12.25 a.m.	f4.5	1 sec.	Clear
14	12.30 a.m.	f4.5	3 secs.	Hazy
15	12.35 a.m.	f4.5	5 secs.	Hazy
16	12.40 a.m.	f4.5	6 secs.	Very hazy
17	12.45 a.m.	f4.5	6 secs.	Very hazy
18	12.50 a.m.	f4.5	6 secs.	Slightly hazy
19	12.55 a.m.	f4.5	6 secs.	Clear
20	1.00 a.m.	f4.5	4 secs.	Quite clear
21	1.05 a.m.	f4.5	4 secs.	A little hazy
22	1.10 a.m.	f4.5	4 secs.	Clear
23	1.15 a.m.	f4.5	3 secs.	Quite clear
24	1.20 a.m.	f4.5	1 sec.	Quite clear
25	1.25 a.m.	f4.5	1 sec.	Very cleear
26	1.30 a.m.	f4.5	½ sec.	Very clear
27	1.35 a.m.	f5.6	½ sec.	Veryclear
28	1.40 a.m.	f6.3	½ sec.	Very clear
29	1.45 a.m.	f5.6	1/5 sec.	Very clear
30	1.50 a.m.	f6.3	1/5 sec.	Very clear
31	1.55 a.m.	f7.0	1/5 sec.	Very clear
32	2.00 a.m.	f6.3	1/10 sec.	Very clear
33	2.05 a.m.	f8	1/10 sec.	Very clear
34	2.10 a.m.	f11	1/10 sec.	Very clear

ECLIPSE DATA

Moon enters penumbra	9.44 p.m.
Moon enters umbra	10.57 p.m.
Totality begins	12.18 a.m.
Totality ends	1.09 a.m.
Moon leaves umbra	2.31 a.m.
Moon leaves penumbra	3.43 a.m.

Photograph taken
at
Portland, Oregon
by
Carl P. Richards

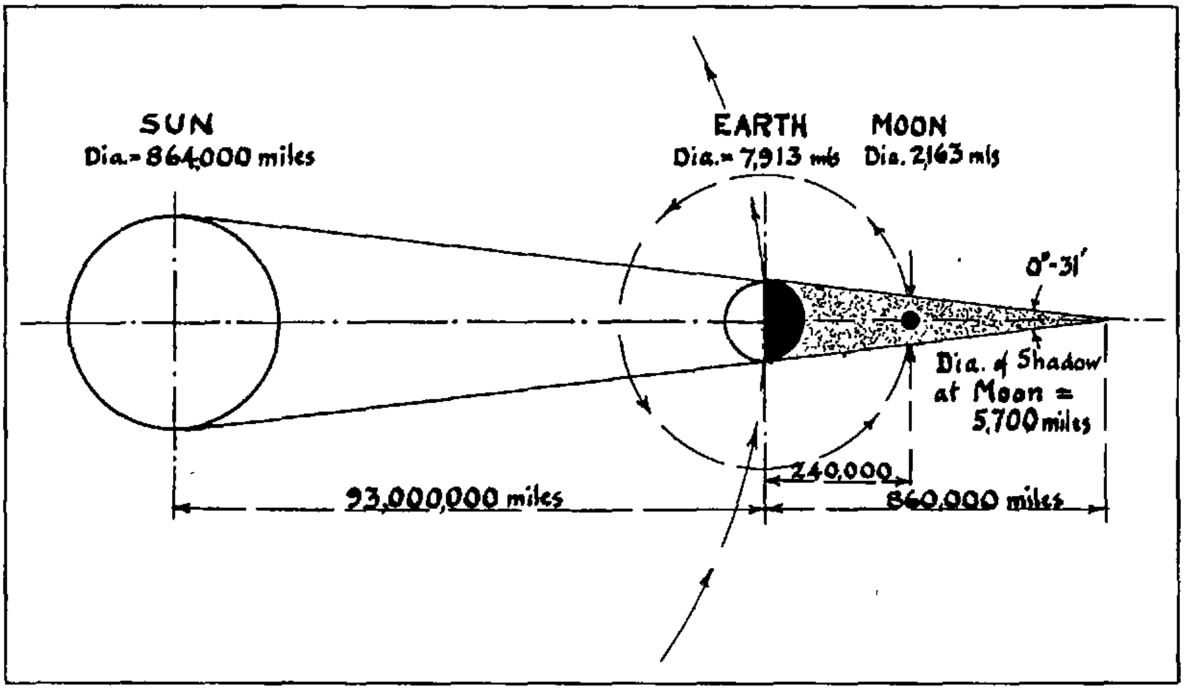


FIGURE 1.

This diagram is not drawn to scale: to make it to scale is entirely impracticable, as there is such a vast difference in the sizes and distances shown. If the scale is taken from the size of the circle representing the Earth, one inch would represent about 16,000 miles. The circle representing the Moon is shown in approximately correct proportion, but the distance between Earth and Moon would have to be 15 inches and the length of the shadow cone about 54 inches. Then the Sun would have to be shown as a circle 4½ feet diameter and 484 feet away from the ½ inch circle which represents the Earth.

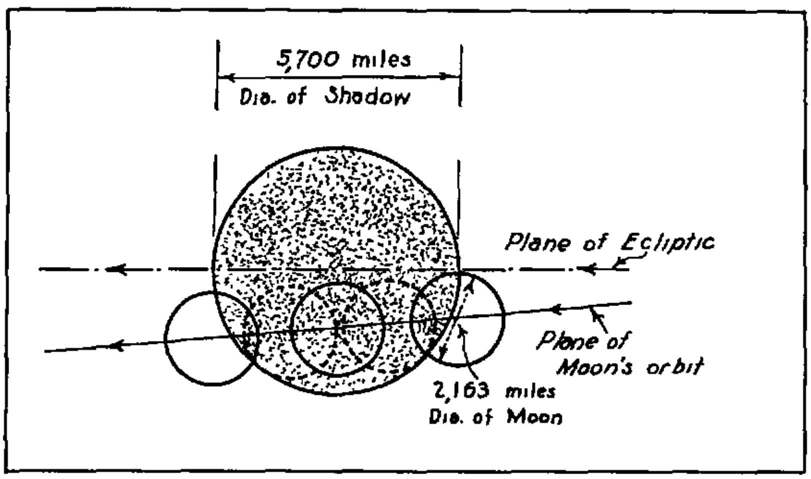


FIGURE 2.

This diagram is drawn to scale: 1 inch - 4,000 miles: it therefore shows in true proportion the Moon and the shadow disc through which it passed. It is a cross section of the shadow cone at the place where the Moon passed through it during the eclipse. The disc of the Moon is shown at five positions. The right hand one is approximately its position at the time of the first exposure on the photograph, and the left hand one its position when the last exposure was made. The middle one shows it at mid-totality, and the two dotted circles indicate positions at the instants of beginning and of ending the total phase.

OREGON HAD FIRST ORE FLOTATION PLANT.

Concentration of mineral values in rock is standard practice. The rock, as mined, contains some ore and a great deal of waste; the problem is to eliminate the waste materials and increase the ore content. Thus transportation costs are lowered, as is the unnecessary smelting of waste rock.

One of the modern methods of ore concentration is by means of oil films. The finely ground rock is agitated in a liquid (usually water) to which a few drops of a certain oil or suitable reagent are added. A froth results, that has the ability to pick up the particular ore mineral desired, and reject everything else.

Sparta, Oregon, was the scene of one of these very early experiments. A recent advertisement of the American Cyanamid Co. featured this experiment in a cleverly arranged two page spread (Mining and Metallurgy, June, 1938). When the State Department of Geology & Mineral Industries asked permission to use this information, the American Cyanamid Co. referred to their advertisers, who forwarded photostats of the article printed herewith.

(R.C.T.)

Mining and Scientific Press Oct.16, 1915, pp.590-591.

HOW MY FIRST INTRODUCTION TO FLOTATION BUBBLES COST ME HARD LABOR AND MORE BUBBLES.

by Ben. S. Revett.

As a preface to my first introduction to the separation of minerals by flotation, I think it may not be amiss to relate an incident that has led me at various times to investigate propositions outside my own branch of engineering.

In the early seventies in my collegiate days, I belonged to a volunteer corps; and at the time of the Wimbledon meeting, when all the rifle-shots of the British Isles and Colonies gathered for their annual sharp-shooters' meeting, I was returning home dressed in my regimentals, the only other passenger in the first-class compartment of the London & South Western railway being an apparently well-to-do farmer, his only package a wicker hamper about the size of a modern automobile lunchbasket. My curiosity was aroused by hearing something moving inside, whereupon I asked, "Pardon me, Sir, but are those puppies you have in your hamper?" "No, pigeons." "May I ask what you do traveling around the country with pigeons?" "Fly 'em". (As I could not disassociate my traveling companion from doing anything except for commercial reasons.) "Pardon me, I trust you will not think me rude, but is there any money in flying pigeons?" "Naw, it's a 'obby; volunteering, young man, is your 'obby or you would not be wearing that uniform. You are not doing it for money - flying pigeons is my 'obby, and there is no money in it, and I am not doing it for money but just because it is a 'obby. Young man, let me tell you that any man without a 'obby is a Hass."

This episode I have never forgotten. In consequence I have at times profited and at other times lost both time and money in following up someone's hobby, but I have always thought it well worth while to investigate anything new to which another man had devoted time and serious study, particularly in these days of specialties.

As a result, in the winter of 1889 and '90, while spending several months in California, Idaho, and Oregon, in the pursuit of my own hobby, alluvial mining. I drove out one day to Sparta, a small mining settlement about 40 miles north of Baker City, Oregon, to investigate some placers. Going into the general store, the only pretentious building in the town, I was amazed to find a man of most generous proportions, who tipped the beam at over 300 pounds, clad in a Prince Albert coat and silk hat, discoursing to a motley gathering of stove pipe miners and others. At first I thought it was some patent-medicine vendor, but on listening I learned that he was telling them of a patent process for the separation and concentration of minerals by grease flotation. Upon walking up, the stout gentleman introduced himself as Mr. Criley, part owner and associate patentee of the Criley & Everson Oil Flotation & Concentration Process, of which he had just completed making a simple demonstration. I said: "Why, Mr. Criley, you are making a decided jump against all known metallurgical practice, as at present grease of all kind is avoided in amalgamation, and mill-men avoid making slime". "True," he said, "that is what Mr. N. P. Hill, the smelter-man of Denver, told me, when he laughed at me, as I suppose you are going to do." I said, "No. Sir, I am not going to laugh at you because seemingly you have a hobby, for I have learned that it is interesting to listen to any man who has devoted time and serious thought to any particular subject, and therefore I should be glad to listen to you". He said, "Well, at least you will admit that unless something new was discovered from time to time the world would stagnate and everything come to a standstill." I said, "On that, Sir, we are agreed." Whereupon Mr. Criley told me of the discovery of Mrs. Everson, his associate, of the flotation of minerals by the reduction of specific gravity when enveloped with grease or oily substance, that he was a mechanic and millwright, and that he and Mrs Everson were partners in the company, that he had a small model, which he took with him for exhibition purposes, and that he had his plant practically complete with the exception of a cheap filter to re-use his acid and oil after the minerals had been extracted therefrom.

Mr. Criley made me the proposition that if I would take a fair sample of the vein in a near-by mine, and would take it to an assay-office in Baker City, reduce the ore to 60-mesh, have the assayer make an assay of it, that he would bet me a quart of champagne that he could save all the minerals with grease and acid in accordance with the assay, and that he would also bet me another quart of "bubbles" that his tailing would not show a trace of mineral by assay. I took both bets and agreed to carry out the program. The following morning I got up bright and early and went to Mr. Blank's assay-office and asked him if he would lend me a bucking-board as I wished to pulp some ore. He informed me that he had no bucking-board but had a good hammer, anvil, pestle, and mortar, to all of which I was most welcome. I took off my coat at once, rolled up my sleeves, and proceeded with my physical task of reducing some pretty hard rock to pass through a 60-mesh screen. After I had been pounding away strenuously for about one and a half hours, Mr. Assayer appeared standing in the doorway, asking me what in the name of thunder I thought I was trying to do.

Whereupon I told him of Mr. Criley's proposition and our bets. He laughed and said, "You are not chump enough to waste your time on any such fool proposition as that, are you?" I replied that I was, and told him of the story of my friend and the pigeons, and that a man without a hobby was a "Hass", that I had found a man with a hobby and wanted to determine which was the ass, he or myself. Another hour passed laboriously along, when Mr. Assayer again came to the door: "Say, I have been thinking this proposition over, and there might be something to the fool thing after all. I will make the assays for you and they won't cost you a cent." "All right, Sir, thank you," said I. "You are Umpire and referee, you shall decide, and also participate in the bubbles whether I win or lose." About 4 o'clock the stage drove up to the door of the assay-office and portly Mr. Criley rolled off the box. Mr. Blank, the assayer, having quartered down the pulp, taken his samples and made his assays, Mr. Criley hung his Prince Albert, silk hat, and cuffs on the wall and proceeded to get ready for business by asking for a washbowl, hot water, some sulphuric acid, and some grease, all of which were cheerfully furnished by Mr. Blank, the assayer, who, by this time, was as much interested in the bubbles - of course I mean the flotation bubbles - and the experiment as I was myself. Mr. Criley filled an earthen bowl with hot water and enough sulphuric acid so that the acidity was just susceptible to the taste, thoroughly impregnating his pulp with some old signal-oil; he kept stirring and stirring until the bubbles floated to the surface of the water and acid, whereupon he panned them off into a handkerchief that he used for a filter, getting his mineral product on the top of the water and not on the bottom of the water as in the usual method of gold-panning. Stirring and agitating until he could not float any more bubbles, he squeezed his handkerchief containing the product, washed off his tailing, handed them to the assayer for check-assays, with the result that I lost two quarts of "bubbles".

Mr. Criley left next day for Portland, and at the depot, searching for some baggage of mine that had been lost, he got into conversation with the owner of a fish-oil refinery, from whom he learned about a filter, an English invention the patent on which had expired. This, in his opinion, was the one thing lacking to make the Criley-Everson process a commercial success.

As a result of listening to a man's hobby, I saw practically one of the first demonstrations of the Criley-Everson flotation process, which is now conceded to have been the pioneer of oil-flotation methods of concentration.

* * * * *

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg.,Portland,Oregon
POSTMASTER: Return Postage Guaranteed

PORTLAND OREGON

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 14 Portland Oregon July 25 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * * *

Lectures.

Friday July 22	:	Motion Pictures, "The Story of Sulfur", 2 reels, depicting the methods of extracting sulfur in the Texas field. These films are prepared by the United States Bureau of Mines, and are authoritative. Time may also permit some reports of the Wallowa summer camp.
Friday Aug. 12	:	Picnic. The Society will remember the wonderful time had by all, at last year's affair. Arrangements are in charge of the Social Committee and they promise us a good time. Full particulars later.
Friday Aug. 26	:	Motion pictures, "The Story of Asbestos", 1 reel, and "From Mountain to Cement Sack", 1 reel. These films are prepared by the United States Bureau of Mines.

Field Trips

Sunday July 24	:	Leader: A. W. Hancock. Summer home of Mr. Hancock at Rhododendron - Yokum Falls - Mirror Lake - Laurel Hill Gold Mine, and the Rhododendron type of formation. This will not be a long trip. We leave the usual starting place, 6th & Yamhill, at 8:30 A.M. and proceed to Toll Gate, one mile above Rhododendron. Mr. Hancock will meet us there. Those who wish to go directly to Toll Gate, plan on being there not later than 9:30 AM.
Saturday & Sunday Aug. 13-14	:	Leader: Russell Collins. Tilly Jane Camp - Elliott Glacier.
Sunday Aug. 28	:	Leader: Harry Jennison. Fossil Locality in vicinity of Wildwood Golf Course.

Luncheon Notes

Those of you who have not been attending the luncheon at L'Abbe on Thursday noons are really missing something. Attendance is holding up remarkably, in spite of the vacation season. Mr. Tallman, from Pendleton, was at the luncheon last Thursday, July 14th, and told us about his collection of Indian arrow heads consisting of 45,000 points;over 20,000 of these were on display at Meier & Frank's this past week. Mr. Jones, mining engineer of Drummond, Montana, told us something regarding gold mining in that area.

Vacations

Saw Chet Wheeler the other day, driving a new car. Some time this fall the Society will have a real treat as he tells us of some of his experiences on his recent vacation, through Bryce and Zion Parks and all waypoints.

While we are on this subject of vacations trips, and so forth, we understand Ken Phillips took several pictures while on his vacation, and the Society would like to see them and hear a report from him also.

* * * * * *

The DESCHUTES FLORA OF EASTERN OREGON: Ralph W. Chaney, University of California, Research Associate of Carnegie Institution of Washington, preprinted from Carnegie Institution of Washington Publication #476, pp. 185 to 216, April 19, 1938.

After a discusion of the Deschutes Formation as described and dated by Russell, Williams, Hodge, and others, the author centers his attention on the section cut by the Vanora grade on the Warm Springs cutoff, about 10 miles northwest of Madras. It was here that the specimens of fossil flora around which the paper is written were collected.

A most interesting comparison between the tuffs and volcanic sediments of eastern Oregon and the volcanic ash thrown out by the eruption of Mt. Katmai in 1912 is made. From this comparison the conclusion is reached that the tuffs of the Vanora grade were deposited near the center of active volcanism probably not more than two or three miles distant, while the older fossil flora of the Clarno, John Day and Mascall formation were buried by ash carried a greater distance through the air.

The Deschutes flora is listed as follows:

Populus pliotremuloides Axelrod
Populus Alexanderi Dorf
Salix florissanita Knowlton and Cockerell
Prunus irvingi new species
Acer negundoides MacGinitie

Similar flora are now found at elevations ranging from 3000 to 3700 feet where annual rainfall is heavier.

A general trend toward a more arid climate is found and at least 5 inches more of rainfall per year is believed necessary for the Deschutes flora than is had on the Vanora grade today. The change is attributed to the increased height of the Cascade Range, rather than any down warping of the Deschutes formation. The Deschutes flora is dated as lower to middle Pliocene.

The paper explains in detail every step taken by the author in arriving at his conclusions and it deserves a careful reading by every member of the Society.

A., D. V.

In the introduction to the above mentioned article, the following appears: "In company with Mr. Brogan and Mr. Lewis H. Irving, of Madras, I visited the locality during the summer of 1936, and secured the material on which this discussion is based". Acknowledgement is also given to A. W. Hancock and A. D. Vance for their assistance in the field.

* * * * * *

In Geological News Letter, vol. 2 no. 16, appears an interesting account of this trip taken by Hancock and Vance. - Editor.

THE IMATACA IRON DEPOSITS OF THE ORINOCO
AND A SKETCH OF VENEZUELA, THE COUNTRY.

by Earl K. Nixon.

In considering Venezuela, I may be forgiven for quoting Caesar, who would have said, "Venezuela est omnis divisa in partes tres," and he would have continued, accurately, as he did, "His lenguas, legibus, institutis inter se differunt." For this country, Venezuela, is amazingly divided into three distinct physiographic, geographic, and geologic provinces; and the dialects and customs, and the traditions of the people themselves in each province, differ from those of the other two. The three provinces I refer to, however, do not correspond to the present outlines of states or political subdivisions.

First, there is the Andean plateau country of western Venezuela, chilly, invigorating, mountainous . . . inhabited from the first by Indian types who are wiry, shrewd, belligerent. The geology here is said to be essentially a complex of late, basic igneous rock types.

Second, is the llanos, or level plains country which includes the area north of the Orinoco and east of the prong of the Andes which reaches north to Caracas. The climate is hot practically all the year, with arid conditions in the dry season and semi-arid conditions during much of the remainder of the year. The people are Spanish-Indian types, often with a sprinkling of Negroes. Geologically, this province is uninteresting, and is well covered by post-Paleozoic and Recent alluvials.

Third, is the jungle country from the Orinoco river south to the Guayana and Brazil frontier, and from the foot hills of the Andes on the west to the Atlantic on the east. For the most part, the area is not over 1,000 feet above sea-level and considerable of it not more than 50 feet above the level of the ocean. It has level to rolling topography, medium to very dense jungle vegetation, and increasingly heavy rainfall as one travels eastward toward the Atlantic coast. Its people who lean more to Spanish than Indian . . . many with a dash of the tar brush . . . are easy-going, peaceful, but inclined to be underfed and malarial, especially along the rivers. This entire province is believed to be essentially a pre-Cambrian igneous complex, with here and there splotches of later intrusives and a few areas of metamorphics of doubtful age and relations.

A five-minute, thumbnail outline of Venezuelan history seems in order, to serve as a background and for a better understanding of some of the amusing, amazing, nauseating, intriguing, and generally unorthodox traditions and customs . . . old Spanish customs . . . which will be touched on later if time permits, after discussion of the interesting iron ores.

In 1498, Columbus, on his third voyage, first saw the mainland of the Western Hemisphere, and the land he saw was the Peninsula of Paria, one of the easternmost points of Venezuela. This point lies only a few miles, across the Gulf of Paria, from the large British island of Trinidad, and is clearly visible from the English city of Port-of-Spain. The next year, 1499, an expedition under Alonzo Ojeda and Amerigo Vespucci sailed along the north coast of Venezuela, left parties here and there, and finally sailed into the mouth of Lake Maracaibo. Here, Ojeda found the natives living in grass huts built on stilts in the lake, sailing about in dugout canoes, as they do today. They named the place "Venezuela", Spanish for "Little Venice".

It was the height of the mad era of the Spanish Dons. In 1521 they swarmed along the length of the coast of Venezuela and established the first permanent colony at Cumana. They went . . these dons . . the aristocracy of the Spanish adventurers and colonists . . farther inland, into the mountains and high plateaus, and in 1550 Diego de Losado founded Caracas, now the capital of Venezuela.

These Dons were more gracious than the conquistadores of Mexico. They made friendly relations with the Indians, taught them to work and how to raise new products; they brought them horses and cattle. They took mates from among the sturdy daughters of the Andean "caciques" and bred a race along the Andean cordillera that influenced the entire later history of South America. From it came such names as Moreno, Villegas, Suarez, Paez, Castro the great Simon Bolivar, and last and most amazing of all - Gomez.

Following the founding of Caracas, the Spanish built other cities: Calabozo in 1695, Barcelona in 1710, and Ciudad Bolivar, which happened to be my source of supplies and is the largest city and port of eastern Venezuela, was founded in 1764.

The cordillera country became the home of feudal lords who ruled the peons. They raised their families in the Spanish tradition, sent their sons and daughters to Europe for culture and the old world graces. The peons became armed retainers. This situation continued for nearly 200 years.

Simon Bolivar was born in Caracas July 24, 1783 - of Spanish noble blood, but of cordillean tradition and background. He was a student of the political and sociological conditions of that guerilla country, and as a political prophet was unsurpassed even by George Washington.

From 1800 to 1830 the history of the country is mainly an account of the warfare of Bolivar, Boves and Jose Antonio Paez. On one occasion Boves' army, fighting on horseback with long lances, defeated Bolivar's army, entered Caracas and massacred 3,500 refugees who had fled to Aragua.

From 1830 to 1846, Paez ruled as dictator. During 1836 he went out personally on one occasion, bottled up the enemy, and killed so many with his sword that his arm was practically paralyzed for a time afterward. Later a little general called Mendoza started some raids. Paez sent out a party to subdue him, but the party was itself wiped out and the leader, Torres, committed suicide rather than face Paez. Paez in person then went out, defeated and captured Mendoza's men, and, finding the bodies of Torres' men their genitals cut off and stuffed in their mouths, Paez (omitting details) executed all the Mendozan prisoners.

From 1846 to 1863 there were five different rulers or dictators: Monagas, then his brother, than Castro, then Tovar, then Gaul, then Paez again for two years.

In the following seven years, 1863 to 1870, there were seven names in succession as head of the government: Falcon, then Bruzual, then Monagas, then Monagas' son Ruperto, then Villegas, then Esteban Pallacio.

Then the strong man Guzman Blanco appeared and ruled the country for 18 years, from 1870 to 1888. Blanco was a typical tropic American aristocrat, elegant, military, addicted to French culture, French language, French perfume, French everything. He was always a bit ridiculous, in bad taste, and unaware of it in his sublime egotism, saw nothing fatuous about calling himself the "Illustrious American". Blanco reorganized the treasury, was an able administrator, gave his friends good jobs, and made eight million dollars by selling the country out to foreign interests. Blanco finally moved to Paris and tried to run the country by remote control, leaving Dr. Rojas Paul. Paul took over, repudiated the foreign contracts, established the freedom of the press, then became infatuated with an Italian opera singer and had a violent love affair which so weakened him that he had to retire from active life - 1890.

From 1890 to 1899 there were three at the steering wheel - Dr. Pallacio, then Crespo, then Andrade.

Juan Vicente Gomez was born in 1857 - date not known as he changed his birthday a time or two to agree with national holidays. He was the illegitimate son of an Andean woman and a Colombian Spanish gentleman. When Juan Vicente was 4 years old, his mother changed over to one Pedro Cornillo Gomez, a peon farmer of the Andean slope. Gomez grew up a farmer and cattleman without schooling. From the beginning he was a community leader. As was the custom, he had several mistresses - never married - fathered many children. A Caracas attorney told me in 1931 they could account for 101 or 102 authenticated children and heaven knew how many more were really his.[1]

By the time Gomez was 30 the military tradition in politics had been established and the Andean race dominated the country. Gomex threw in with Julian Castro, a strong dictator who ran the country with Gomez doing the fighting. They straightened things out, then Castro placed Gomez in as right bower and sat back to take things easy. Castro had all the moral vices, and immediately established 22 mistresses in houses he built for them about the city. Gomez was in constant trouble with revolutions, but with his cunning, won all the tricks. On one occasion Castro went to save Gomez, in a tight spot, but had to be saved by Gomez, he had been so weakened by orgies with the twenty-two.

Castro, old, and sick from debaucheries, sailed for Germany in November 1908. Gomez took over completely in December of that year and ran the country until his death in December 1935. By 1914 he had brought the country from five million dollars in the red to that amount in the black, in the face of a money-maintained dictatorship. He put his friends in office but kept changing them around often so they couldn't get a foothold. There were three presidents at Cd.Bolivar from the summer of 1930 to late spring of 1932 when I was there.

Gomez built no roads, no schools, nothing of note - except on his own estates with government money. None of Gomez' sons were worth training in his steps. At his death there was no mourning. A couple of his sons escaped the country with about 2 millions in gold bullion - happy to escape the hands of the people. Such is the history of Venezuela - and "old Spanish customs".

I went to Venezuela in July 1930, stayed not quite two years. I was in charge of an extensive iron exploration, using 3 diamond drill outfits, and mapped, party with transit survey, some 150 square miles of mountain and jungle, and covered perhaps that much more with reconnaissance survey. We cut a couple or three hundred miles of jungle trail, using from 75 tO 125 natives. We built and rebuilt about 25 miles of road and a number of bridges. I wouldn't have missed it for a million, and wouldn't do it again - unless someone paid me enough.

GEOLOGY.

General. We know all too little about the geology of Venezuela. The geological work that has been done has been practically confined to the Maracaibo lake basin, and to the llanos country north of the Orinoco. Most of this has been geophysical, specifically, seismograph work by the various oil companies. Tentative correlations of Mesozoic and Tertiary rocks in the western part of the llanos country have been made, but the presence of much recent alluvial material has made stratigraphic work difficult. This llanos country, ending at the east with the great delta of the Orinoco, has promise of being among the major oil producing areas of the world, according to statements made to me by oil company officials whose opinions should carry much weight.

The Andean plateau country, as stated above, is not very well known, but is said to be composed principally of fairly late, basic igneous rocks.

We shall confine our remarks to the Orinoco area and to the region to the south, which is essentially a pre-Cambrian acid igneous complex.

It is commonly believed that the Orinoco river is the locus of a great fault, several hundred miles long. This seems reasonable because it is bordered on the north by post-Paleozoic rocks, and on the south by south-dipping metamorphics of much greater age. South from the Orinoco, the country is rolling with here and there low mountains and ridges often with broad, flat savannas between. Jungle covers much of it from the Caroni, a river the size of the Columbia, east to the Atlantic. The farther east one goes, the thicker becomes the jungle on account of the greater rainfall.

The Imataca Iron Formation, in which we are mainly interested, lies in the form of a narrow belt a couple of hundred miles long, immediately on the south side of the Orinoco river. It is a metamorphic rock, essentially a ferruginous quartzite, and may lie on the Archaen complex. Relations are obscure. It strikes about N. 70° E., and apparently dips at various angles to the south. Locally it is folded and distorted by intrusions of later rocks. From the attitude of the pseudo-bedding in various places and from the orientation of some local ore bodies, we gather that the formation has suffered considerable block faulting. Along the strike, the crop of the formation is discontinuous, due to cross-valley erosion. Topographic forms and the extent of local erosion of the crop of the formation are determined by the high or low iron content of the quartzite. I have examined many iron properties, but never before have I seen a place where I could tell from a distance merely from the height of a hill, whether the core rock would run around 30% iron or 45%. It seems a little silly to think one can assay rock a half mile off, but I have paddled down the Orinoco in a dugout canoe a half mile off shore, and made fairly close guesses - as later determined definitely - as to the iron content of the quartzite ridges, merely judging by the topography. One has to get offshore, often, in order to see much on account of the jungle at the water's edge. The vegetation on the ridges is sometimes distinctive, sometimes not.

Megascopically the quartzite itself where not mineralized is usually a pinkish to gray, seemingly recrystallized but poorly cemented, medium-grained rock. Where it is mineralized, one finds all phases from a slightly iron-stained, brownish, limonitic, nondescript type, to the very highest grade hard blue or specular hematite. Only rarely I saw a thinly laminated phase. One of the most interesting types is composed of medium to coarse, gray quartz grains speckled with magnetite crystals of the same approximate size as the grains of quartz. This type often looks like a mineralized gneiss with a well-developed banded structure of alternating gray and black - the latter representing a higher concentration of magnetite grains. One phase grades imperceptibly into another richer or poorer in iron by the simple process of the quartz or the magnetite grains displacing the other in point of abundance. Where the iron mineral was disseminated, it was usually magnetite; but sometimes little veinlets or iron mineral were found cutting the bedding. Usually this mineral was hematite.

In thin section - I had no opportunity to examine any of these rocks or ores, although I sent specimens to the States for examination and interpretation by Dr. Steidtman. I have record of the microscopic examinations of various types of rocks and ores from there by Dr. Short for E F. Burchard of the U.S.G S., by Guillermo Zuloaga of M I T working under Lindgren and Newhouse, and Dr. Chas. P. Berkey, as well as by Dr. Steidtman. References then to microscopic evidence come from the work of Drs. Steidtman, Short, and Berkey, and Mr. Zuloaga, and from Dr. E. C. Harder of the Aluminum Company of America, with whom I discussed the origin of these ores.

It may not be improper to state that one of these men holds definitely to magmatic origin of the ores, another to sedimentary plus replacement, a third to vein-dike origin, and the fourth, the most famous of the lot - states in his published conclusion - and I quote him: "The character and field relations . . . lend support to the possibility that either of two quite different modes of origin may be ascribed".

I may have the temerity to suggest, after stubbing my toes over many million tons of this ore for many months, after diamond drilling several thousand feet of it, after scratching handsful of hair out of my head and thousands of wood ticks, plagas, bachacos, niguas, garapodas, gusanos, etc. off my body - that it is my definite opinion that the origin of the iron is sedimentary, from the quartzite, and that the ores in their present state are replacements of the metamorphic country rock by high ferruginous hot solutions which have exuded from later basic intrusions of gabbroic rock.

Referring again to the quartzite, or we may call it the iron formation, as distinguished from the ores - In thin sections the grains of quartz are fairly clear, seldom strained, often angular and interlocking as in a normal crystalline rock. Zuloaga reports finding goetite, hedenbergite, apatite, and possibly zircon. The magnetite apparently is primary and the hematite secondary, replacing the magnetite. The magnetite grains are replaced portion by portion by the hematite until only the original shell remains of the magnetite crystal. Geotite seems to be the last mineral deposited and also replaces the magnetite. Occasionally quartz veinlets cut across the bedding of the quartzite.

The Imataca quartzite would seem to be a thick, shore deposit, although no ripple marks or fossils have been found in it. It is overlain apparently by an assortment of volcanic tuffs and dolomitic shales of unknown age. By those very few geologists who have seen both, or who have seen one and specimens or detailed studies of the other, the formation is correlated with the Itabirites of the Central Minas Geraes of Brazil - mainly because of similarity and associated mineralization rather than because of known stratigraphic relations or from any paleontologic evidence. The Itabirites of Brazil are considered lower Paleozoic. I am inclined to think of the Imataca as pre-Cambrian, possibly equivalent to the great deposits of ferruginous Animikie or Huronian sediments of our Lake Superior region. The Imataca is a ferruginous quartzite, whereas, the Animikie is composed of chemical sediments - iron carbonate and silicate, locally concentrated to ore by removal of silica.

Canga At several points along the length of this belt of ferruginous quartzite which follows the Orinoco, there are high bluffs which rise several hundred feet above the river. These contain ferruginous rock or ore running up from 10% to 50% iron. The surface is usually covered with a limonitic, iron hydrage capping called "canga", a few inches to 3 or 4 feet thick which entirely obscures the underlying condition. Lenses of good grade ore occasionally occurring in the quartzite are hard to find. Following the canga laterally or transversely of the deposits, one is invariably led, not to a contact, but to a merging of the canga into bauxitic material or the soil of the jungle.

Finding contacts in the jungle is practically impossible without digging. Weathering goes to great depth. I drilled one diamond drill hole a few rods from the edge of an orebody - for purposes of elimination - 150' deep in 4 shifts, without making any core and with very little caving. The material, virtually bauxite, in this case, ran 40% to 50%. Al_2O_3 and the nature of the sludge samples suggested a weathered acid granite. It was too high in silica for aluminum ore.

In the jungle where an intrusive forms the core of the ridge, its outcrop is apt to be a great mass of boulders lying helter-skelter, and well rounded by spawling and exfoliation, and the slope of the ridge is often covered by boulder talus which conceals all contact relations. Cover the ridge with jungle containing trees up to 140' high, a mat of smaller trees, brush and vines so thick that a trail must be hacked through with machetes - where one can often see only green above, or occasionally a patch of sky, and you can picture the difficulty of ascertaining geological field relations. At times during the rainy season I have obtained rock specimens and carried them many yards along a trail to a point light enough to allow examination with hand lens - with the sun shining brightly somewhere above. The vegetation is much denser in rainy season. Out on the savanna in the dry season one may go a mile to find a spot of shade big enough to sit under. Incidentally one does not sit down on the ground or on a stump in Venezuela, as there are 1000 kinds of boring worms, ants, ticks and parasites. One squats on his heels - Chinese fashion.

The ores. Thirty miles south of the Orinoco and at some distance from the main exposed quartzite belt are the areas of high grade iron ores known as the El Pao ore deposits, - the Minas di hierro. Here the quartzite is poorly exposed if at all. The main orebody occupies the top of a rather flat mountain which rises rather abruptly to an elevation of 1800' to 2000' or roughly 1000 feet above the floor of the surrounding jungle. Jungle covers the mountain - or did before we cut most of it off. It doubtless covers the mountain again unless it has again been cut off by the Bethlehem Steel Corporation which owns it and is now building a railroad in to it. The top of the mountain is roughly the shape of the bottom of one's shoe with a crest or fringe of ore all around the edge of the sole and heel, and a great orebody of some 15 million tons exposed across the instep. The flat top of the mountain where not covered by ore in place or by talus ore boulders, supports a jungle mat, as stated, with deep humus and soil beneath. Two igneous rock types are found on the lower slope of the mountain: one a normal granite, the other a norite. The latter is mainly diopside and hypersthene with locally oligoclase feldspar. Exceptionally, the granite contains considerable amounts of diopside and hypersthene with a little labradorite, a very unusual association with quartz. Veins of norite cut the granite, and phases of quartz monzonite and quartz diorite grading through the gabbros are produced by the microcline giving way to oligoclase, the latter increasing as the proportion of diopside and hypersthene increase. The texture remains that of a granite. At one point near the ore a banded rock composed of pink microcline and quartz appears. Here the quartz is strained, as evidenced by undulatory extinction in thin section.

The norite at El Pao forms the hanging wall of the orebody and takes the form of a flat-lying dike or sill. In hand specimen, it is green to black and looks like a gabbro. From the large amount of hypersthene it seems better to me to call it a gabbro. In thin section it is found to contain black hornblende, diopside, hypersthene, magnetite and labradorite, or bytownite. Hypersthene is about 40% of the rock, and, showing an index of 1.7 is practically pure $FeSiO_3$. It is strongly pleochroic - pink and green. The iron oxide grains in the norite near an orebody are slightly banded like ilmenite, show no titanium, no leucoxene, and are probably magnetite. At one point, the norite or gabbro is altered to serpentine.

The iron ore of El Pao is strikingly unique in some respects. It is by a small margin the highest grade large orebody known to exist. Burchard of the U.S.G.S. gives it the following composite analysis:

	Fe	Phos.	Al_2O_3	S.	Mn	SiO_2
El Pao	68.6	.02	.23	.02	.15	.40
Brazil	68.6	.02	.47	.02	.19	.46

A number of our 5-foot diamond drill samples ran between 70% Fe and 71% Fe or slightly better than theoretical for hematite, indicating a small magnetite content. The ore is very hard and has a texture that furnace men dream of. It has a gneissic structure and apparently represents a replacement of both igneous and sedimentary rocks at this particular occurrence. It is so dense as to have a volumetric or cubic foot-per-ton factor for ore in place of about 7, whereas most iron ores are figured on a basis of 9 or 13 cubic feet of ore per ton in place. 12 is accepted as legal for tax valuation for hematite in northern Michigan. It is, of course, of the best Bessemer grade, commanding a premium because of low phosphorus content; its deleterious ingredients are negligible. Obviously, an ore running nearly 69% iron - which composite analysis represents many millions of tons - can't have much in it but metallic iron and oxygen. Most of the 15 million tons in this main orebody can be mined by open pit methods, using power shovel loading directly into railroad cars. The ore is worth about $7.00 per ton laid down at Sparrows Point, Maryland, and is especially desirable for alloys and for mixing with lower grade ores of certain analyses to bring up the iron content and cut the phosphorus.

Referring again to the probable origin, I tried vainly to find, or recover core from, the contact zone of the ore with the country rocks. I never found it exposed, - always covered with a deep cover of canga. Drill bits invariably broke suddenly from the hard ore into a soft zone making no core. I almost sanded in bits several times in this transition zone. I did find corundum crystals at one point in close association with the ore, indicating hydrothermal origin of the solutions effecting the replacement. The iron was evidently first deposited as magnetite by replacement of the surrounding rock, and then the magnetite was nearly all replaced by hematite. In thin section or polished section, the magnetite crystals are shown as being progressively replaced by hematite, the replacement starting in the middle and going outward, sometimes leaving a shell or skeleton of the original magnetite crystal.

To me it is inconceivable that anything like such a great mass of coarsely crystallized, highest grade hematite, could be deposited without some unusual combination of conditions. In this case the evidence seems ample that three fortunate factors were present, viz: Intrusion and dynamic metamorphism, coupled with the presence of the already highly ferruginous country rock.

As I picture the sequence of events at El Pao, you have a ferruginous quartzite running say 40% iron, faulted and lying against a granite body. Intrusion of basic rocks from below, the locality of intrusion being guided in part by the deformation, followed and served to introduce hot solutions probably carrying some iron, and in a position to dissolve much more from the surrounding rocks in passage. These hot solutions aided in their passage by deformation and regional metamorphism started, in this case, a vein-dike mainly of magnetite, but with some primary hematite, at the contact of the iron formation (ferruginous quartzite) and the granite. With the primary vein-like deposit at the contact, replacement went on to varying distances away, governed by the porosity of the rock, the force and abundance of the mineralizing solutions, and the assistance lent by a doubtless contemporaneous regional metamorphism.

It was my impression that replacement of the granite was not great, whereas, the replacement of the quartzite reached a half mile from where

I believed the contact to be. In almost all places in the massive hematite, one can note a vestigial gneissic structure. Either this is the structure of the replaced quartzite reflected in the secondary ore, or, it might be the result of differentiation within the magma before chilling, if we propose magmatic origin for the orebody. The former is more plausible.

* * * * * *

Experts Cut Rock Into Slices Thinner Than a Sheet of Paper: Christian Science Monitor (date unknown).

The Christian Science Monitor reports on the details of preparing rock sections for study under the petrographic microscope. The data was given them by the Natural Science Correspondent of their paper, and it contains many inaccuracies. Albeit, it is an informative article and well worth reading.

The article explains how the U. S. Geological Survey prepares these "thin sections". A portion of the rock is sliced with a rock saw; it is then ground and polished with carborundum powder until it has a thickness of one-one-thousandth of an inch, or 0.03 mm. It is now thin enough to allow light to pass through it. The specimen is now studied and the minerals identified.

The Correspondent states that "only three or four laboratories in the United States are able to duplicate the process used in Washington ---", and the entire story is built around the assumed fact that there is something mysterious about the process. As a matter of fact, there are few schools of geology with a department of petrography that allow their students to graduate until they have prepared specimens which are 0 03 mm. in thickness, and have identified the minerals in the rock. Instead of the process being something mystic, practically every geology graduate has performed the major portions of the operation.

The specialists of the U. S. Geological Survey are, however, extremely well trained in the art of identifying the minerals in the specimens. The newspaper article may have meant that there are only three or four laboratories in the United States that are as well equipped with instruments and man-power with which to identify the minerals. Such a statement would be nearer the truth.

The moral of this story is to not believe everything you read, without giving it some careful consideration, first.

R.C.T.

THE FABLE OF A SUNSET

by Phil F. Brogan.

(Editor's Note: The following article is revised from an editorial that appeared in the Bend Bulletin, June 29th, 1938. The essential story is unchanged).

Visitors to the Brothers country on the Deschutes plateau greatly prize the semi-precious stones found in abundance on highlands once swept by tropic seas and later mantled by a redwood forest. But the memory of summer sunsets over the snowcapped Cascades will be retained long after the luster of their stones from Central Oregon had been dulled by age.

Probably the visiting gem hunters see no connection between Central Oregon gems and the colorful sunset, with its flotilla of golden clouds drifting over the Cascades and the bronze thunderheads guarding the eastern horizon. There is a fable of the imprisonment of colors in agates, "thunder eggs," jasper, petrified woods and iridescent obsidian, found in the lonely land that reaches eastward to Hampton Butte.

Long ages ago, so this story goes, ocean waters receded from Central Oregon, to be succeeded by a rain-belt forest whose tall sequoias reached toward a sky generally hidden by heavy storm clouds from a warm ocean. One day so the story goes, the earth was rent by terrific explosions, lava issued from great fissures and fiery rock covered oldsea shores and toppled giant redwoods. Hot mineral laden waters spurted geyser-like from thermal springs. And in the west the earth folded into a mountain range. Massive volcanic cones quickly formed, and the Cascades of Oregon, still unsculptured by glaciers, came into existence.

Clearing weather suddenly came to Oregon of old, as the new-born Cascades reared their rosary of domes heavenward, and the red sun moved toward great mountain barriers dimmed only by volcanic smoke. As the sun sets for the first time behind the new mountains, the western sky was transformed into colors more gorgeous than the banded hues of the rainbow.

Fallen redwoods, thrown over by lavas, slipped into lake ooze, but not before they caught the brilliant colors of that primeval sunset and left them imprisoned in agatized wood. Mineral jellies retained the reflection of that sunset, like a photographic film, then receded into gas cavities in volcanic rock to form chalcedony. Syrup-like rock caught the glow of that first Cascade sunset to form iridescent glass. Water from giant geysers fell in colorful spray, created miniature rainbows, then percolated into deep caverns to mould semi-precious stones.

This fable about the origin of Central Oregon's interesting gems has not yet received the sanction of geologists, it is true. They argue that a mountain range, like Rome, cannot be built in a day. But how, we ask, could the semi-precious stones of Oregon's present high desert have obtained their colors and iridescence if a primeval sunset over smoking mountains had not provided their strange hues?

"Summary of Late-Cenozoic Geology of Southeastern Washington": Richard Foster Flint, American Journal of Science, 5th series, vol. 35, no. 207, pp. 223-230, March 1938. (Available in Portland Library).

This short paper summarizes the known and inferred geology of Southeastern Washington. The Columbia River basalt dips contripetally toward Pasco, and this region dip is interrupted by gentle folds represented by the Frenchman Hills, Saddle Mountain, and Rattlesnake Hills. The faulted fold of Horse Heaven Hills bounds the basin on the south, and the name Pasco Basin has been given to it. There is a brief description of the Ellensburg (late Miocene) and Latah (Miocene) sediments. East of Lyons on the Snake River there is an 8-foot bed of poorly consolidated conglomerate that is found 700 feet below the top of the basalt. The drainage pattern is quite complicated; the consequent drainage is represented by Palouse River, Rock Creek, and Cow Creek, marginal drainage by the Spokane River and part of the Columbia River; cross axial by the Columbia River below Wenatchee. Dr. Flint proposes that the Columbia River is antecedent to Horse Heaven Hills uplift, that it flows eastward along the base of the scarp and crosses at the low point. Of the basalt sediments, the Ringold formation was probably originally 1000 feet thick, composed of clay, silt, sand, and gravel, and it postdates the Horse Heaven upwarp. The Palouse soil is eolian, it overlies the basalt, and its relationship to Ringold is obscure. Glacial outwash materials are abundant. The post-scabland wind-blown sands are nicely developed in the area west of Hanford and White Bluffs. Many pebbles are found in this area with excellent polish and faint facets, probably caused by wind-driven sand.

It occurred to the reviewer that the conglomerate in the Snake Canyon, 700 feet below the basalt may have some relationship to the Snipes Conglomerate-Satsop-Hood River problem, and that the polished and faceted pebbles in the Hanford area might be reworked from some bed of Snipes Conglomerate. Society members will recall that Mr. C. P. Holdredge found abundant faceted pebbles in the Snipes Conglomerate. The reviewer also has difficulty in accepting the eolian origin for the Palouse soil, at least that of eastern Washington.

The article adds little to the general knowledge but it is a good summary if one is interested in a condensed geologic history of southeastern Washington.

R.C.T.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed

PORTLAND
OREGON

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 15 Portland Oregon Aug. 10, 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * * *

Special Notice

Remember this date - FRIDAY EVENING, AUGUST 12th - at Mt. Tabor Park. The Annual Picnic and Get-Together Meeting of the Geological Society of the Oregon Country.

Bring your own lunch. Coffee with trimmings will be served by the Society at 6:00 P.M.

Bonfire in the Crater later in the evening. Games for the children (large and small). Group singing, special number by the quartet. Ladies bring geological picks.

Lectures

Friday : Motion pictures, "The Story of Sulfur", 2 reels depicting
Aug. 26th : the method of extracting sulfur in the Texas field.
"The Story of Asbestos", 1 reel, and "From Mountain to Cement Sack", 1 reel.
These films are prepared by the United States Bureau of Mines, and are authoritative.

Field Trips

Saturday : Leader: Russell Collins.
& Sunday : Cloud Cap Inn - Coe Glacier.
Aug. 13-14 : Bring your sleeping bags and other camp equipment to Tilly Jane Forest Camp, near Cloud Cap Inn, on Saturday.

- Mt. Hood in the moonlight! Don't miss it!
- We shall start on the walk about 7:30 AM Sunday from Cloud Cap Inn.
- Easy high mountain trail through meadows and trees near the timberline to Coe Glacier.
- The trip is so pleasant that the eight miles round trip will go by unnoticed.
- The Cloud Cap Inn vicinity is a great place to spend the day so that those not wanting to hike still may have a good time.
- Cameras? Yes, by all means!
- The north side of Mount Hood is beautiful.
- Bring your lunch in a packsack.
- Will return to cars about 4:00 PM.

Sunday : Leader: Harry Jennison.
Aug. 28 : Fossil locality in vicinity of Wildwood Golf course.

Luncheon Notes

Now that our official reporter has returned from his vacation, we hope soon to be resuming his regular column recording some of the interesting things happening at our Thursday noon luncheons. Since our last issue the Carneys have returned from an extended vacation trip Some of places visited are as follows: Gingko Forest of Washington - Coulee Dam - Grand Tetons - Bryce Canyon - Bonneville Salt Flats - and then in Nevada came the

Mormon crickets. Tom's story about the crickets had the sound of many a fish story we have heard, but with this difference: Tom had the pictures to prove his story. We like this part of Oregon; let us hope the Mormon crickets never hear of our delightful climate, because judging from the pictures, if they do - members of the Geological Society will want to move out.

Glad to see Miss Rose Jenning back with us once more. Miss Jenning said after her trip to Oklahoma and Chicago she was glad to get back to Portland and a place to rest.

Clarence Phillips and family are back from their vacations at Cannon Beach. Clarence said he played some golf, went fishing and crabbing, time passed so quickly he did not find time to study geology.

Mr. Vance read a letter from President Treasher, in which Ray told of some of the work they are doing in Wallowa section. He says he misses our Thursday luncheon. Well, we know, Ray, that at least Franklin Davis misses you because he can't find anyone who wants to start an argument with him.

Mr. Stevens told of two recent trips he made, one to Denver and Dinosaur National Monument, and the other to Yellowstone National Park.

<u>New Member:</u>

Miss Myrtice E. Fowler,
4933 NE Garfield Avenue
Phone MU 6385

C. J. Borum has been transferred to Lansing, Mich., and his address will be 202 P.O. Bldg., Lansing, Mich. We hope Mr. Borum will not forget the Geological Society of the Oregon Country and its members, and if he finds things of geological interest in that part of Michigan he will let us know about it.

* * * * * * * * * * * * * C O R R I G E N D U M * * * * * * * * * * * * *

Owing to a reduction of size in the process of reproducing the two figures illustrating the article on the total eclipse of the Moon, (pages 144-5 in the issue of July 10), the scales stated are not quite correct. In fig. 1 the diameter of the circle representing the Earth is such as to give a scale of 1 inch equals 18,100 miles. Hence, if drawn to that scale, the circle for the Sun would have to be 4 feet in diameter at a distance of 428 feet from the circle which represents the Earth.

In fig. 2, the scale stated as 1 inch equals 4,000 miles should read "1 inch equals 4,400 miles".

A TRIP TO THE WALLOWA MOUNTAINS

W. Claude Adams

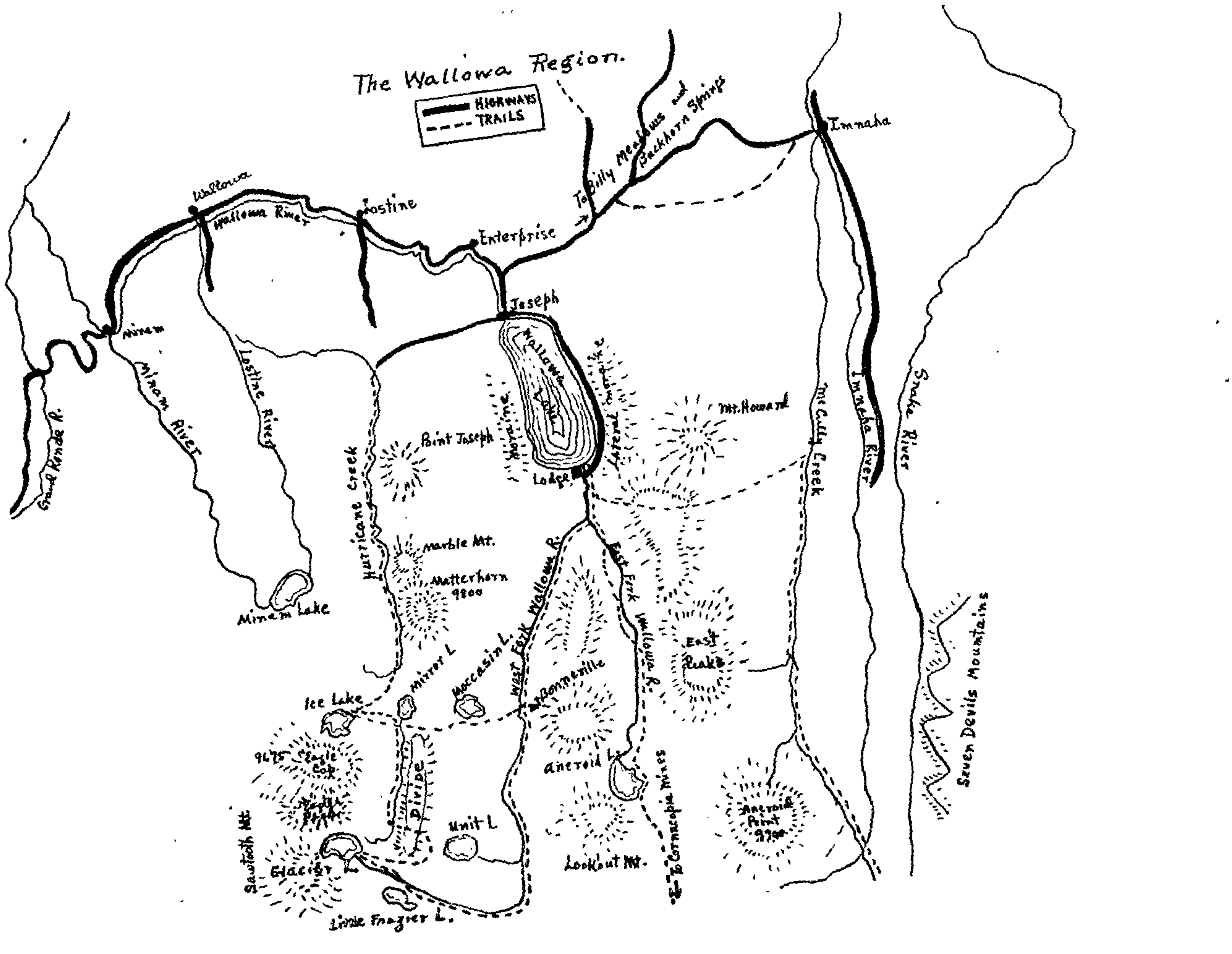
The Wallowa Lake Wonderland, the Switzerland of America, situated in the northeast corner of Oregon, is a region of such matchless beauty and grandeur that the unforgettable memory of a few days spent viewing its wonders is among one's choicest possessions. One need not go to Switzerland or other Alpine regions for mountain scenery, for we have it all in the Wallowas, on a smaller scale, doubltess, but nevertheless an Alpine region of towering, snow-capped peaks, with living glaciers, myriads of gleaming blue lakes, rushing streams and waterfalls, meadows cut by meandering streams, flowers of varied colors, wild life - a spot primitive, wild, and, as yet, unspoiled, 223,000 acres set aside by the Government as a primitive area. And yet, relatively few know of it and have visited it.

The "Wallowa region", as the most scenic portion is designated on the forestry maps, is only a small part of the extensive Wallowa National Forest. Its chief distinguishing features are the ruggedness of its mountains, the large number of high peaks, around thirty, all of which are nearly as high as Mount Hood, many being over 9,000 feet; the high lake basins containing sixty-odd lakes at an altitude of 7,000 to 8,500 feet, some nestling at the base of glaciers, often reflecting in their mirrored depths the snowy peaks whose jagged summits pierce the skay at dazzling heights.

Roughly, there are three principal areas of scenic interest in the Wallowa Mountain country: counting from the east, the Imnaha country from the Tenderfoot Basin following down the Imnaha river and over to the Snake river, the Aneroid country, reached by the East fork of the Wallowa river, and the Lake basin, reached by the West fork, with its numerous lakes and the high peaks of Eagle Cap, the Matterhorn, etc ; and furthest to the west, the Lostine-Minam river region, the two rivers feeding from opposite ends of Minam lake, high in the Wallowa range.

To explore all of the Wallowa Wonderland would require weeks of time, but if one had only a few days to spend, perhaps the best trip to take is that leading to the main Lake Basin which is readily accessible from Wallowa Lake and which contains the finest and most spectacular scenery in the Wallowa range. If one spent three days, as we did, on such a trip, one would be so impressed by the grandeur and magnificence of the region that the memories of its wonders would last the rest of life.

In the Wallowa Mountains are the headwaters of the Imnaha river, McCully creek, East and West forks of the Wallowa river, Hurricane creek, Lostine and Minam rivers, largest of the streams. All of these streams rise in the high mountain area and flow downward in ever widening sectors, with mountain ridges between, until they are many miles apart when they reach the valley. So it is possible to ascend to the high mountain country by following up these several different watercourses, by trail, and it is not until the higher altitudes are reached that it is possible to cross over from one route to another. Except for short distances, this area is not accessible by auto, and it is only by trails that it may be reached, either by saddle and pack horses, or on foot, if one is hardy. The elevation rises from 800 feet at Wallowa Lake to 8,500 feet in seven or eight miles.


The Wallowa Region.
HIGHWAYS
TRAILS
Grand Ronde R.
Minam
Minam River
Minam Lake
Wallowa
Wallowa River
Lostine
Lostine River
Enterprise
Joseph
To Billy Meadows and Buckhorn Springs
Imnaha
Imnaha River
Snake River
Hurricane Creek
Point Joseph
Moraine
Wallowa Lake
Lodge
Lateral moraine
Mt. Howard
McCully Creek
Marble Mt.
Matterhorn 9800
West Fork Wallowa R.
East Fork Wallowa R.
East Peak
Mirror L
Moccasin L.
Mt. Bonneville
Ice Lake
9675 Eagle Cap
Divide
Unit L
Aneroid L
Aneroid Point 9700
Glacier
Sawtooth Mt.
Little Frazier L.
Lookout Mt.
To Cornucopia Mines
Seven Devils Mountains

Several years ago, Mrs. Adams and myself visited the Wonderland, motoring over the Old Oregon trail, leaving it at La Grande, passing through the Grande Ronde valley, over Minam Hill with Minam river gorge 1000 feet below, then following the Wallowa river through the valley towns of Wallowa, Enterprise and Joseph to Wallowa Lake. This was the home and hunting ground of Chief Joseph and his tribe of Nez Perces. After he and his people had been driven out of their ancestral home by the settlers and the army under General Howard, Chief Joseph died later on the Colville Reservation, and in 1926 his remains were brought back and entombed in the Indian burying-ground on the terminal moraine at the north end of Wallowa Lake. The school children of the county erected a monument marking the grave.

The road leads around the east side of the lake, which is a mile wide and five miles long, flanked on each side by lateral moraines. Arriving at the lake, you are facing the Wallowa range, which rises abruptly from the south end of the lake, with Mt. Joseph on the right, Mt. Howard on the left, and Mt. Bonneville in the center. It is the reflection of Mt. Bonneville which is seen in most of the pictures of Wallowa Lake, a beautiful body of water in an ideal setting.

At the head of the lake where we camped, we outfitted for a three-day trip into the heart of the Wallowas, our objective being the Lake Basin and Eagle Cap. Another couple went with us. The gentleman, having been a government photographer in that country twenty years before, proffered his services as a guide. We secured horses for the ladies and a pack mule for the bedding and grub. Mr. Smith and I took to the trail on foot. The trails are steep and sometimes arduous, and at that early date were rough and poorly defined. The route led up the West Fork of the Wallowa river, a rushing mountain stream with beautiful Wallowa Falls not far from the Lake. As we ascended, we would sometimes find ourselves in an amphitheater entirely surrounded by mountains and we would wonder how we were going to get out, but the trail led us on and the inevitable gap would always appear, through which we passed into new vistas.

Our guide lost his bearings and instead of our turning to the right, past Moccasin Lake and over an easy pass of 8,500 feet, we continued up to the headwaters of the West Fork past Little Frazier Lake, where we camped overnight, to Glacier Lake, its source. The route continued to get rougher and steeper, and we realized we were off the trail. It was necessary to ford back and forth across the stream several times, and finally to cross the divide at a high point, so steep that it was almost impossible for the ladies to stay on the horses' backs. On the downward slope of loose shale rock, the horses, trail-broken even as they were, refused to go any farther, so we were compelled to build a trail for the descent. We crossed another stream and finally reached Ice Lake at the base of Eagle Cap.

Missing the trail had its compensations, for we were enabled to see two beautiful lakes which we would not have seen otherwise, Little Frazier with its mirrored stars, and Glacier Lake, one of the largest and bluest, fed by Benson glacier on Sawtooth mountain.

From Ice Lake, elevation 8,000 feet, we made the ascent of Eagle Cap, 9,675 feet elevation, that same day. From the summit, a panorama of superb beauty lay before us on all sides, glorified by the rosy tints of the setting sun. From this lofty and central peak we could see the Seven Devils range over in Idaho, other faraway jagged ranges, snowy glaciers, and closer at hand, the Matterhorn and many other rugged peaks. Down below us, like so many jewels, gleamed twenty-five or thirty blue lakes and tiny silver streamlets meandered in curving outline through the green meadows. It was a sight wonderful and breath-taking, and yet the on-coming darkness compelled us to leave it after fifteen brief minutes; even so, we were making the difficult descent after dark. Our companions gave up the climb and had returned to camp. It was the flare from their fire which guided us safely into camp. The time of year was the last of August, and already it was very cold at night in that altitude. We kept fire all night to keep warm. Next morning we broke the ice in Ice Lake to get water for bath and breakfast.

We made a loop trip, returning to Joseph down through the Hurricane canyon, a narrow gorge hemmed in by high mountains on both sides and affording, a good share of the way, barely enough footing for the narrow trail that follows along the precipitous left bank of the creek. Here is one of the most interesting places, geologically, of the whole region. In the Marble gorge, Hurricane creek has cut a deep narrow gorge, and the torrential waters of this mountain stream roar and tumble down through the almost perpendicular walls of what was said to be marble or limestone. Rising precipitously from the east side of the canyon is the most spectacular mountain of the whole range, Marble Mountain, a shapely mass of glistening white marble.

We regret that we were not geologically minded at this early date, for there is geology apparent on every hand, fairly clamoring for notice. We noted, however, the prevalence of huge boulders and massive cliffs of granite, with their micas glistening in the sun, and many beautifully-stratified sedimentary rocks, as well as black limestones and white and dark marble. We obtained one very fine specimen which we afterward learned is aplite dike. We brought home several specimens of different rocks, but poor Maude's inability to carry more than our camp outfit forbade our loading her down with more rocks.

It seemed that the region should have valuable building material in her abundant supply of marble and granite, if there were any way of getting it out to market, but we understand that the granite is too badly jointed to enable quarrying large enough pieces for monument or building purposes; besides, the inaccessibility of the locality would make the price prohibitive. The mountains are rich in several kinds of ores and there is considerable mining activity in the southern part.

The Wallowas furnish an ideal place to study glacial action, erosion, moraines, meandering streams, sedimentary, intrusive and metamorphosed rocks.

It is a heaven for the geologist.
It is a mountaineer's delight.
It is a fisherman's paradise, with stocked lakes and 1300 miles of fishing streams.
It is a mecca for the prospector.
It is a bonanza for the bird lover and botanist.
It is a wonder of wonders for any Nature lover.

NEW ROAD TO THE SEA

(Wolf Creek Highway)

F. L. Davis, Trip Leader.

May 15, 1938.

For many years residents of the Portland area have clamored for a short route to the northern coast of Oregon. The two existing roads to the ocean, the Lower Columbia River Highway and the Salmon River road, give very ainadequate connections. At long last, under sponsorship of the counties traversed and of Multnomah County, two new short roads to the sea were started as W.P.A. projects. One of these, the Wilson River road, will give direct access to the sea near Tillamook; the other, the Wolf Creek road, will give direct access near Seaside. These two roads are indicated on the map accompanying this article. The Wolf Creek road is now under construction westward from Sunset Camp, the Wilson River road westward from Glenwood.

These two new roads pass through areas considered Oligocene in age mainly, and the highway cuts were early reported to have unearthed many fossils. Reports of trips on the Wolf Creek road by individuals led the writer to make a preliminary trip to the area early in 1937, when a fossil mollusc, Thysauria bisector, was found at one locality. Dr. Packard, in identifying this invertebrate, stated that to the best of his knowledge, it had not been found theretofore in Oregon, although reported numerous times from Washington.

Later in 1937, the writer led a small group of the Society to the locality 0.9 mile west of Sunset Camp; many choice specimens were found. Since that date road construction has advanced rapidly and so it became possible, by the spring of 1938, to drive over the road bed for 10 miles west of Sunset Camp to a point immediately west of Bear Creek Camp.

In view of these facts a trip was considered desirable in this newly opened territory. This trip was dated as early as the nature and condition of the roadbed would permit. The map will show the large area which has not as yet been studied owing to lack of access. The object of the trip was to study the geologic features exposed in the cuts and to collect fossils for identification and for aid in determining the stratigraphic horizons. A log made on a preliminary trip is attached to this report.

The stop at mile 36.2 permitted members to hear Dr. Francis Jones discuss the supposed "forams" found here by him in 1937 and the neighboring igneous exposure and contact.

The first stop on the subgrade of the new Wolf Creek road was at mile 46.6, where a cut exposes deeply weathered fossiliferous shale. Here the group collected many invertebrate marine fossils. Some of these already identified are: Dentalium, Turcicula Washingtoni, Nautoloid, crab in concretion, shark's tooth, Thysauria bisector (a clam), miscellaneous gasteropods, and several others, including a leaf fossil. The most common species found was Thysauria bisector. Messrs. Piper and Vance spent most of the hour we

TRIP OF G.S.O.C
TO WOLF CREEK HIGHWAY
MAY 15-1938. F.L. DAVIS.

ROUTE SHOWN IN HEAVY BLACK.

remained at the locality in examining exposures in the adjacent banks of Wolf Creek.

A new cut for a logging road about a mile north of this locality was examined on the preliminary trip and many fossil marine invertebrates were found. They were less well preserved than those in the cut on the highway.

The next stop, at mile 51.1, yielded a few fossils of the same types as at mile 46.6. Messrs. Vance and Piper stole the show here by demonstrating a method of scaling the sides of the deep and steep cut (almost 1 to 1) by means of a rope made fast at the top of the slope. Miss Catlin demonstrated her climbing ability by ascending the cut by this wrinkle; a movie by Clarence Phillips proves this statement beyond doubt.

About 0.2 mile farther on, igneous extrusives excited considerable comment. Mr. J. P. Thompson, a visiting geologist from Spokane connected with the Soil Conservation Service, discussed the possibility of an Eocene window at this place. The numerous crystals of amethyst, quartz, and calcite gave plentiful evidence of modifications in the rock after it had first formed. Mr. Thompson's remarks gave rise to much discussion on the part of Ray Treasher, who it turned out, is a former classmate.

The next and last stop, at mile 54.5, was at high noon, just beyond Bear Creek Camp there, thanks to the W.P.A. engineer Mr. - - - -, who had escorted the party from Wolf Creek Camp, a satisfactory luncheon place was found. The engineer also supplied a 10-gallon tank of pure cold water. After the lunch a bountiful talk fest was much enjoyed. Mr. Treasher actually had the opportunity to say all he wanted to about everybody without contradiction - not much! Visitors were introduced and Mr. Thompson spoke further of his impressions of the exposures. Mr. Piper discussed the general features exposed along the line of march and gave the corresponding locality numbers to the Geological Society. These are as follows:

Mileage, this trip	G.S.O.C. locality	Location
46.2	NT-6	SW$\frac{1}{4}$ NE$\frac{1}{4}$ sec. 9, T. 3 N., R. 5 W.
46.6	NT-7	N$\frac{1}{2}$ NW$\frac{1}{4}$ sec. 9, T. 3 N., R. 5 W.
51.1	Nt-8	NE$\frac{1}{4}$ SW$\frac{1}{4}$ sec. 2, T. 3 N., R. 6 W.

At mile 54.5, the marine sediments appear to have been modified by heat and some intrusives. A conglomerate superficially similar to a gravel-asphalt paving mixture was found here. Mr. Thompson expressed the opinion that it had formed as a hot mud flow around gravel. The only fossil found here was the oyster, which was difficult to separate from the modified sedimentary rock.

This was the end of the trail and the return as a caravan was made to Camp Wolf Creek, where the group examined the cut for a bridge approach. Here the group broke up as a caravan and the Wolf Creek fossils breathed a sigh of relief when they saw the last of the geologic-emblem stickers on the rear windows of the departing autos. But have a care, Mr. Fossil! the geologists will get you yet if you don't watch out!

LOG OF TRIP ON WOLF CREEK HIGHWAY TO SEA.

May 15, 1938.

Leader: F. L. Davis

Round trip 108 miles.

Speedometer Mileage	Intervals (Miles)	Time (Estimated)	Location	Remarks
0.		8:00 AM	Lv Pacific Bldg.	Estimated road speed 30-35 MPH on highway-20/30 MPH on Wolf Creek highway.
23.8	23.8	8:40 AM	Ar Forest Grove	Caravan assembly on Gales Cr.Rd.
		8:45 AM	Lv Forest Grove	
26.1	2.3		Ar Road Cut	Marine fossils in outcrop
27.3	1.2		Ar. Road Cut	Marine fossils in outcrop
34.7	7.4		Ar Quarry	Basalt quarry across Gales Creek previously visited; zeolites found
36.2	1.5	9:00 AM	Ar Concrete Bridge over Gales Cr.	STOP. Prof.Francis Jones located Foraminifera in bank of stream here. New Wilson River road to the sea via Tillamook starts here.
		9:10 AM	Lv. "	
41.2	5.0		Ar. Road Cut	Marine fossils
42.6	1.4		Ar. Timber	
45.7	3.1		Ar Sunset Camp	Wolf Creek road to sea starts here. Caravan continues on subgrade.
46.6	0.9	9:30 AM	Ar Road Cut	STOP. Cut opened about a year ago has yielded numerous fossils of Oligocene age, some of a type not previously collected in Oregon.
48.7	2.1	10:40 AM	Ar Wolf Cr.Camp	STOP. Road barricaded here; farther travel by permit only. PROCEED WITH CAUTION.
		10:45 AM	Lv Wolf Cr Camp	
50.9	2.2	10:55 AM	Ar Road Cut	STOP. Deep cut in dark gray shale weathering drab. Fossils include Solen, Dentalium, Modiolus, large Nautoloid.
51.1	0.2	12:00 N.	Lv road cut	Igneous extrusives veined with calcite, varies in color from reddish to black.
52.4	1.3	12:10 PM	Ar road cut.	Large exfoliated boulders in road cut.
53.4	1.0			Road forks.
54.0	0.6	12:20 PM	Ar Bear Cr.Camp	STOP. End of trip for autos. Lunch. Walk half mile to road cut showing fossil oysters. Nearby is a gravel conglomerate with black matrix. Road is roughly graded about 5 miles farther.

END OF TRIP.

54.0		2:30 PM	Lv Bear Cr.Camp	The caravan should keep together until cars are checked through barricade at Camp Wolf Creek. Members of caravan may then proceed homeward at will.
62.3	8.3	3:00 PM	Ar Sunset Camp	
108.-	45.7	4:15 PM	Ar Portland	(Provided no stops on route). Please report all unusual specimens to leader for trip write-up.

THE SCABLANDS OF THE COLUMBIA PLATEAU: A REVIEW.

Flint, Richard Foster, Origin of the Cheney-Palouse Scabland Tract, Washington: Geological Society of America, Bulletin, vol. 49, pp. 461-524, 10 pls. incl. maps, 11 figs., March, 1938. (In Portland Library technical room).

This paper is one of a series by Dr. Flint who is attempting an explanation of the "scabland channels" of eastern Washington. These channels were called to our attention by the work of J. Harlan Bretz on the Spokane Flood hypothesis. Flint's thesis is that the evidence can be explained by normal erosion, rather than by a cataclysmic flood. He has raised many interesting questions and answered not a few. His study of the lithology of the sediments is particularly well done by his aid, Dr. Krynine. An explanation of the sedimentation in Lake Lewis is attempted and many controversial points about the silts of the Wallula area are discussed. A dam in the Columbia River near Hood River or Cascade Locks is favored, although he definitely states this to be an opinion as yet unsupported by facts.

The impression gained by one who is somewhat familiar with the Cheney-Palouse tract is that Dr. Flint is following Dr. Bretz' trail but in a slightly different direction. Many criteria are cited, but many are overlooked or ignored. It is the reviewer's impression that the complete story of the Scablands will not be solved by a few short field seasons. Rather, it will take a careful catalogue of all cirteria without prejudice to any preconceived theory. When all the data are assembled and critically studied, a lengthy explanation of the formation of the Scablands will be justified.

The order of events is summarized by Dr. Flint as follows:

"1. Advance of glacier ice-lobes across the Spokane-Columbia canyon at the northern margin of the plateau, to the divide between drainage north to the canyon and drainage south on the plateau. If the Okanogan Lobe or the Columbia Lobe reached the plateau before the Little Spokane Lobe, a lake may have been formed in the canyon, and an overflow spill established down the Cheney-Palouse tract, before the encroachment of actual glacier ice south of the divide."

"2. Occupation of preglacial valleys and erosion of basalt in them, by the meltwater flow."

"3. Rise of Lake Lewis in the Pasco basin, causing aggradation of material in the tributary valleys to form a thick fill, growing vertically upward and also headward."

"4. Cutting of Palouse scarps by lateral planation and development of lateral distributaries from the principal routes as the streams rose on their own fills. Sedimentation in Lake Lewis, progressively overlapping stream deposits in the mouths of the tributaries."

"5. Draining of Lake Lewis, accompanied by progressive dissection of the fill into cut terraces, together with the cutting of more Palouse scarps and terraces and the erosion of more basalt, chiefly by stream channels superposed from the fill. Offlap deposits built into receding Lake Lewis, most of this secondary sediment later eroded and carried off down the Columbia."

"6. Backwasting of the glacier ice margin beyond the divide in the Spokane district, shutting off the supply of meltwater and causing the Cheney-Palouse tract to run dry except for the through drainage of the modern Palouse River-lower Snake River system."

"7. During the whole sequence of events, showers of volcanic ash fell at many times, and the ash was incorporated in the growing fill, and in the deposits of Lake Lewis and the Riparia Lake."

The scabland sediments exhibit relatively small average grain size, good size sorting, fair rounding, and shallow fluvial stratification. They grade downstream into parallel bedded silts and fine sand in the Pasco basin. The "Palouse soil" at the channel margins does not have a single long profile, but represents multiple terraces, recording streams cutting laterally on various profiles. The slotlike canyons, small plunge pools, hanging valleys, were eroded by relatively small streams operating on various profiles. Evidence is cited to indicate that Willow Cr. "bar", Stairbase Rapids "bar", Palouse Canyon "bar", and others stressed by Bretz, are the work of normal sedimentation. The volume of the fill necessary to occupy the channels is available from the eroded channels and additional contributions of silt from north of the plateau.

Bretz' hypothesis implies that the "Palouse soil" was scrubbed from scabland, and that Palouse scarps at lateral margins of the flood should fall into a single long profile recording the high water mark. In reality, the "Palouse soil" is conspicuously terraced. In small tributary valleys of non-glacial origin, the "soil" is not terraced, being protected from effective lateral planation by the proglacial streams. The numerous lakes, the basins of which were cited by Bretz as evidence of plucking by high velocity, large volume streams, are not as deep as thought. Flint asserts that Rock Lake is in reality quite shallow. The dry falls and plunge basins of the Cheney-Palouse tract were formed by small streams although the reader gains the impression of rather insufficient evidence to support the contention. A good point is made by citing the features of Umatilla River valley, characteristic scabland topography, yet unoccupied by glacial melt water. Flint's assertion is that the evidence indicates preglacial valleys modified by meltwater streams, the valleys widened; a relative rise in baselevel (formation of Lake Lewis) followed by a relative decline.

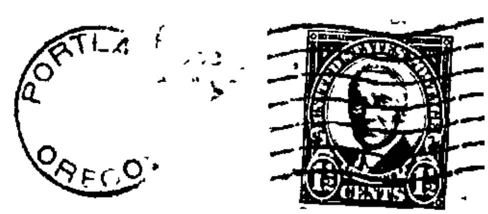
The Touchet beds of the Pasco basin are used as a record of Lake Lewis. The material is quite fine, 65-80% fresh rock flour, 20-35% colloidal aggregates of Palouse soil, and 1-5% volcanic ash, parallel bedded, and contains occasional foreign pebbles (probably ice rafted). Flint favors a dam in the lower Gorge; discusses possibility of a glacial ice tongue down Hood River valley, or that the Cascade landslide dammed the River. Frlint will still have to find evidence of a dam that will pond water to an elevation of 1150 feet.

Riparia Lake on the Snake River is discussed and an attempt is made to prove that it was formed by a fill dam. The distributaries across major divides, Devil's canyon and Palouse Falls, were formed as the water level was raised, the channels silted in, and water poured over the lake's banks.

The article is well worth studying. Additional data are presented for the complex problem of the formation of the scabland channels, the evidence should be carefully weighed and investigated whenever one is in the vicinity of any of these scabland forms.

RCT

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed



Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 16 | Portland, Oregon | Aug. 25, 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * *

Lectures

Friday Aug. 26th :	Motion Pictures: "The Story of Sulfur", 2 reels depicting the method of extracting sulfur in the Texas field. The sulfur occurs in disseminated form in the rocks, and hot water is pumped down - the sulfur is dissolved and forced to the surface in a molten condition. "The Story of Asbestos", 1 reel, showing the mining of asbestos and the preparation of the fiber for market. "From Mountain to Cement Sack", 1 reel, which illustrates the manufacture of cement. These films are prepared under the direction of the United States Bureau of Mines, in cooperation with the various industries. They are accurate and authoritative.
Friday Sept. 9th :	To be arranged.

Field Trips

Sunday Aug. 28th :	Oligocene marine fossils; leader, Harrie L. Jennison. The party will assemble at 6th and Yamhill, the usual meeting place, at 8:30. Cars will proceed to the Wildwood Golf Course just below Burlington on the Lower Columbia River Highway. The cars will be abandoned, and the party will hike about 4 miles to the fossil locality. Boots or heavy shoes are recommended as there is considerable brush and down-timber at certain points. Canteens are also specified. The trip is not a difficult one, and the locality has yielded a quantity of good fossils.
Labor Day Week-End Sept. 3-5 :	Definite decision has not been made for this trip. A number of suggestions have been made, such as: Three Sisters, about 225 miles of driving each way (total of 450), and considerable hiking. Camp would be made near the road, but each day's trip would be by "shank's mare". Warm Springs Indian Reservation trip, about 125 miles of driving each way (total of 250), some hiking; it would be a camping trip. Other suggestions include two one-day trips. SEE NOTICE AND QUESTIONNAIRE ON PAGE 179.

Luncheon Notes

Thursday Aug. 18th :	The luncheon of Aug. 18 was especially well attended. The occasion was the visit of Dr. Petrullo, from the Washington, D.C., office of W.P.A., to the Oregon Country in the interest of scientific projects. Dr. Petrullo told the luncheon group of many ways to use W.P.A. help and funds. Mention was also made of the possibility of a geological museum in connection with the proposed civic center being developed on the Lloyds property. A stenographic record

of Dr. Petrullo's talk has been promised the News-Letter, but it had not been received at the "dead-line". Dr. Petrullo was accompanied by eight members of the W.P.A. supervisory staff.

Just in case you have forgotten: -- members of the Geological Society of the Oregon Country have been meeting together at noon on Thursdays. The occasion is the necessity of obtaining food, as well as the need for good fellowship. Any member of the Society, their guests, or anyone interested in geology is welcome, and cordially invited. Specimens are passed around and discussed, interesting bits of news are retailed, and a general good time is had by all. The luncheon place is at 9th and Salmon, in the Coffee Shop of the Roosevelt Hotel. The time is 12:00 noon. The luncheon adjourns when everyone is gone. Come in when you can, - if it's 12:30 or even later, you are still welcome; if you feel that you should leave before the group breaks up, there is no objection to that. Everything is entirely informal. How about seeing you at the next luncheon?

* * * * * * * * * * * * * * * NEWS OF THE MEMBERS * * * * * * * * * * * * * * *

Mr. and Mrs. Raymond Baldwin are forsaking the City. A new house has been in the process of construction for the past many weeks, and the time has come for the owners to take possession. The new home is located somewhere on Canyon Road. Mr. Baldwin states very positively that there are no rocks on the place, and no fossils, but he hopes that sufficient attraction of other sorts can be provided for visiting members.

Mr. Earl K. Nixon returned recently from a "flying trip" to the British Columbia-Yukon boundary on a private consulting assignment. He has a very unusual group of pictures taken from the airplane that show many interesting forms of glacial topography. Mr. Nixon states that the new "baby-clipper" will be a god-send to the air-minded Alaskans, as the only air route took him three times across the breadth of B.C. before he reached the Yukon.

Mr. Clarence Phillips is reported to be out-of-town. Why don't some body tell us these things ! ! ! ! ! !

Mr. President, the Ray Treasher, is back from what people insist on calling his holiday in the Wallowa Mountains. He is awfully quiet about his experiences. Wonder what happened?

Dear Mrs. and Mr. Member: Do you like these News Notes? If so, you can make them more interesting if you will phone in some data.

FIELD TRIPS

What Do You Want?

The Geological Society of the Oregon Country is a Society composed of some 125 or 130 members, each of whom has paid their dues and has a legal voice in the activities of the Society. Arrangements for lectures and field trips can be made, but it is desired that these arrangements satisfy the requirements of the greatest number. Your advice is requested. You may feel that the arrangements should be up to a Committee, acting upon their own ideas; if you don't like them you don't have to attend.

But our Society cannot grow and prosper under such an attitude. We must provide activities that will interest the entire Society. Therefore, if you hang back with your suggestions, you are tending to cripple the Society that you profess to enjoy.

Will you therefore assist your officers and committees by giving them the benefit of your suggestions???? Please!!!!! Copies of the following questions will be distributed at the lecture Friday night. If you are unable to be there, will you fill out this blank and mail it to the trip chairman?

1. What is the maximum mileage you care to go on a one-day trip?__________
2. Where do you wish to go?__________
3. On a 2-day trip, such as a week-end, what is the maximum mileage that you care to go?__________
4. Where do you wish to go?__________
5. Are there any trips you would like to have repeated?__________
6. On repeated trips where do you wish to go?__________

We are in need of trip leaders. It is not necessary that you be able to explain all the geology; what is required is that you scout out the trip ahead of time, and have some planned itinerary. The Society will discuss the geology! ! we hope.

Would you lead a trip?__________ Your name __________

Where?__________ Telephone No.__________

When?__________

Chester Wheeler,
Trip Chairman.

THE MEMORIAL DAY HUNT FOR CLARNO FOSSILS

by A. W. Hancock.

The itinerary of the field trip of May 29-30 as proposed by the trip committee might have read something like this: Passing over the plains about Portland toward the town of Sandy, up the glacier-carved valley which furnishes courses for the Sandy and Zigzag rivers, through the western edge of Dr. Hodge's supercrater of which Mt. Hood is the central cone, on across the head of Still Creek and Salmon river where remnants of several Pleistocene lakes can still be seen, thence over the Clear Creek divide, and on to the Madras formation of Pliocene age which slopes gently southeastward for many miles.

Dropping down the precipitous west side of the Deschutes River canyon we traverse the Columbia River basalt of Miocene age. East of the river we travel over the Shaniko surface of this Miocene lava rock to and about seven miles beyond the town of Shaniko. There we descend the Antelope escarpment and reach the John Day formation of Oligocene age. Then along the valley and up Maupin Mountain to a saddle from which a view of breath-taking grandeur opens suddenly before us: a landscape of mountains, rivers, and valleys; strata on edge, tilted, bent, and broken, tumbled about in every conceivable fashion like the crumpled pages of a book carelessly opened. An epic of the ages is disclosed before us, from the early Tertiary to the present.

This is truly a geologist's paradise; every hill has perpetuated some stirring period of history, and every canyon is a virtual storehouse filled with heirlooms of the geologic past. In the midst of this setting, the caravan was scheduled for its two-day sojourn.

Now for the actual trip:

First let us say that three organizations, The Geological Society of the Oregon Country, the Mazamas, and The Pathfinders, jointly made up the group, and that the advance guard first reached the area Thursday evening, May 26.

On Friday the advance guard blocked out material containing fossils so that by Sunday, when the main group was to arrive, there would be ample for all. By Friday noon the weather was too hot for comfort and the three days to follow were anticipated with foreboding.

Friday afternoon one car of Pathfinders and three of Geologists found their way into camp. Mr. Weber and Mr. Oberson broke into the Friday arrivals only by a nose - See them for particulars. Their story is a long one and of doubtful scientific value, sounding more like a melodrama of the Old West - gunmen and everything.

About six o'clock Friday evening rain began to fall and continued until ten. This statement can be verified by Mr. Malone and party, who came sans tent, expecting, as Miss McGraw expressed it, to sleep under the desert stars. Since a trivial shower had developed into a prolonged downpour, our noses were poked from beneath dripping covers at every trifling noise, to see whether Mr. Vance was in evidence. Yet the sudden storm was a blessing in disguise, for Saturday broke a perfect day, with the excessive temperature cooled. During the forenoon a few more cars filtered in and by nightfall the initial small camp had grown to resemble a frontier boom town, where each one as he arrived staked his claim and set up housekeeping. Some belated cars did not arrive until Sunday morning but when all noses were counted, 29 cars and 103 persons were present.

The vernacular of Hollywood might lead one to describe the events of the day in this vein: "At a signal given about eight o'clock hill no. 1 was attacked by a fossil-hungry army equipped with hammers, picks, shovels, potato sacks, and paper cartons. The conflict was fierce and lasted for hours, but the hill was completely subdued and much booty taken". Seriously, many fine specimens of fossil flora were found, especially the seeds of walnut, almond, oak, and date. Many other seed pods of undetermined species also were found. At its base hill no. 1 is composed of Eocene rocks; above, the surface of contact with the overlying Oligocene rocks is so clearly disclosed that one may step from one horizon to the other in a single pace.

This remarkable occurrence of well preserved Eocene flora is in Wheeler county, in the SE$\frac{1}{4}$ sec. 27, T. 7 S., R. 19 E. The rocks are of volcanic ash or tuff; the stratum richest in fossils is about 10 feet thick, dips about 45° NW., and passes under the John Day formation of Oligocene age.

Those who wished a variety of specimens visited the Oligocene leaf beds about a mile and a half to the north and secured some fine material.

Again in the Hollywood vernacular: "Sunday afternoon a terrific dynamite blast on hill no. 2 was the signal for another onslaught and in a short time the heights were occupied and sacked. The fruits of conquest included fossil cycads, ferns, and delicate leaf impressions of many types."

The statement that no land fauna had yet been found in the Eocene of Oregon, soon was challenged by the announcement that Mrs. Arthur Jones had discovered "bones" embedded in a cliff just across a dry canyon from the camp; specimens were immediately brought in. The excitement had hardly died away when Mr. Baldwin reported a similar find. Unfortunately, specimens from each of these localities, when brought to Portland, showed no bone structure under the microscope. Thus, the quest for Oregon's "missing link" goes merrily on.

Sunday evening - after the tasty camp-cooked food had been downed with "store-boughten" beverages or with the water so kindly supplied by Mr. Jennings, superintendent of the Clarno Basin Oil Corporation - the crowd gathered around a huge bonfire of sage and juniper. The "Four Musketeers" announced their program of entertainment, truly the high light of the trip. For this program much credit is due the Misses Connie Enders and Emma Nordgren, also the Iverson sisters and Elmer Roberts. Dr. Arthur Jones presided as master of ceremonies and was at his best with pleasing wit and repartee. Mr. Ben Medofsky was called first and, after a short talk, led the group in singing "The more we get together". The Misses Florence Boyrie and Marion Kell followed with a geologic duet, May Walker gave a reading, and Isa Botten introduced the new Mazama song (her own composition, I believe). Next was a very interesting talk on snakes, bugs, and "things" by Mr. Oberson. Mr. Ray Treasher geologized briefly but entertainingly and was followed by

Mr. Munger with a Scotch song. Mr. Hancock talked about Black Butte. Mr. Leo Simon was called upon and gave a very instructive talk on plant life of the semi-arid environment; Mr. Tate very cleverly presented the tableau "a picture for you". By this time the coolness of the evening had begun to tell on the "tenderfoots", who one by one harkened to the call of the sleeping bag, but a few elected to snuggle closer to the dying embers of the campfire and to sing the old favorites. The "night owls" followed Mr. Simon to one of the nearby hill tops for star gazing.

It was perhaps midnight before the last straggler found his way to the "hay", surrendered to Morpheus, and finally quieted down to the relief of those trying to sleep.

By 5 a.m. the camp was again astir with life. From scores of fires, little blue streamers of smoke ascended skyward from crackling sage and the tantalizing aroma of bacon and coffee filled the air.

By 7:45 the breakfast dishes had been cleared away, all dunnage packed, and the caravaneers were once more on their way. At eight o'clock the group halted at the Clarno oil well, where the heavy drilling equipment was inspected. Mr. Jennings, the superintendent, kindly explained just what made the wheels go round.

At 8:30 Mr. Schminky volunteered to pilot the group to some interesting wind-carved pinnacles on Hoodoo Hill. It is hoped that some good photographs were secured.

At 9:30 the last scheduled stop was made at hill no. 3, the mammal beds. As before, "the gallant army was ready and anxious for action. Some deployed to the right and others to the left but the majority went over the top in a formation so close that no horse, camel, or rhino could possibly have escaped. So thorough was the mopping up that bones which had remained undisturbed since the Oligocene were dragged from their last resting place to satisfy the rapacious maw of science".

At this locality the group broke up and departed independently for home.

BLACK BUTTE

(John Day River, Clarno Crossing)

A. W. Hancock.

Black Butte, we hail you! Mighty monarch of your realm rising a sheer thousand feet above the surrounding hills - your giant profile looms against the western sky and presents a spectacle amazingly beautiful, yet awe-inspiring.

Under the influence of your magic spell, we are wont to philosophize - to speculate. Strange thoughts surge through our minds as we seek to visualize your history - to interpret your past - to predict your future.

Shoved hot and liquid from mysterious subterranean recesses, you stand today the very personification of permanence. Yet any thought of absolute stability is but an illusion. A time is coming when you, the great basaltic monolith of the present, will be no more.

Lying at your base is one of the great fossil deposits, laminated strata enclosing the records of life forms which ruled the Earth of long ago. Each form had its heyday and then retrogressed millions of years ere your dark shadow echoed the footfall of man.

You have seen great lakes come and go; fruits tropical and semi-tropical have clothed your valleys in fabulous abundance. These are gone, yet firm and stately you stand and guard well the secrets of dead centuries. Today the clouds float ominously over, the sun sinks behind your ghost-like spires, darkness sweeps on and blends all into one - suggesting universal kinship. Morning must come and you will still be with us.

Untold ages will pass before your appearance alters greatly; nevertheless the four horsemen of your doom - sunshine and rain, frost and wind - are eternally gnawing at your vitals. The small glassy crystals of which you are composed are slowly but surely breaking apart; other cycles of usefulness await you. Tomorrow's life-giving soils will claim of you their full measure, while portions unused on land will help to build the floors and beaches of future unnamed seas.

EARTH MOUNDS IN UNGLACIATED NORTHWESTERN AMERICA.

In the Geographical Review for January, 1938, A. E. Porsild (National Museum of Canada) discusses the peculiar mounds which are a feature of Arctic areas in the Seward Peninsula and Mackenzie District. The Eskimo name "pingo" (conical hill) is applied to these mounds. These pingos may contain peat, clay, pebbles and lacustrine mollusks, as well as ice. In plan they are commonly oblong or oval, with steep outer slopes and ruptured crests.

Earlier writers have ascribed such mounds to hydraulic pressure set up when ground water progressing along the water table was dammed by downward freezing, which freezing is assumed to have begun upon the emergence of the shore line from the sea. This pressure may have acted slowly to bulge the earth's crust upward locally, or the crust may have been violently fractured with the discharge of considerable quantities of water and silt, the latter adding to the size of the mound The author admits the validity of this theory for the formation of pingos in areas of considerable surface slope; but recognizes a new type of pingo, common in the flat areas of the Mackenzie River delta, whose summits may be 100 to 500 feet above the surrounding plain and higher than any land within many miles. These appear to be associated with shallow lakes or former lakes. It is suggested that such mounds are caused by local upheaval due to freezing of lenses of water, entirely enclosed by progressively freezing earth or ice.

Eskimos are reported to have noted changes in the appearance of some pingos, "even an increase in size during a lifetime". Botanical evidence favors the view that the climate is growing progressively colder. The paper is illustrated with 6 photographs, including 2 aerial views.

K.N.P.

REVIEWS

THE MONO CRATERS, CALIFORNIA

In the Geographical Review for January, 1938, the topography, physiography and geology of MONO CRATERS are discussed in a paper under the above title by William C. Putnam, California Institute of Technology. (15 pp., 5 drawings, 11 photographs).

Mono Craters lie south of Mono Lake in eastern California, just east of the Sierra Nevada. From a pumice covered desert they rise 2,700 feet to an elevation of 9,169 feet at the summit of the highest dome (suggested name, Russell Dome, after I. C. Russell). The surface of the craters is largely covered with pumice, there are 12 mapped domes, or obsidian plugs, and 3 large flows (here called "coulees"). The coulees are of brown or black obsidian, with nearly vertical fronts, the largest, Southern Coulee, is estimated to contain 1/6 cu mile.

Mono Craters date from late Pleistocene. Pumice is interstratified with deposits from a high stage of Mono Lake, but overlies moraines of Wisconsin age. Subsequent eruptive sequence: (1) Explosion in pumice produces a roughly circular pit, into which (2) a plug or dome of viscous obsidian rises, eventually spilling over to form (3) a steep-fronted flow or "coulee" of fractured blocks of obsidian. The walls of the dome are commonly so steep that the explosion pit is not filled, leaving a depression or dry moat around the dome within the explosion pit.

Excavation of a tunnel to carry water from Mono Basin through the southern part of Mono Craters to Owens River for diversion to Los Angeles has provided data on geology of that section, included in the paper. Discharge of large quantities of cold carbon-dioxide gas into this tunnel is the only evidence of volcanic activity today.

K. N. P.

Doerner, H. A., Magnesium; present outlook for a magnesium metal industry in the Northwest and a discussion of methods by which magnesium metal may be obtained from magnesite ores; State College of Washington, Mining Experiment Station and State Electrometallurgical Research Laboratories, Bulletin P, 90 pp., 5 figs., 11 tbls., bibliography, July, 1937. 35¢ (In cooperation with the U. S. Bureau of Mines).

Metallic magnesium and aluminum have many points in common. They are the only light weight metals available for structural purposes. Magnesium is lighter than aluminum; has the same tensile strength for equal weights; for equal stiffness, structural shapes of its alloys are far lighter than any other material; it is more easily machined than any other structural metal; it can be cast, forged, extruded, and welded. Aluminum excels magnesium in ductility and resistance to corrosion.

The two metals are competitors for many uses, but the higher cost of magnesium has crippled its use. Dr. Doerner states that there is little difference between the price of magnesium and that of aluminum when it had the same volume of production. He predicts that with equal volume of production, magnesium can be produced as cheaply as aluminum.

The above paragraphs show that metallic magnesium is a metal which when alloyed with steel should have considerable use in structural materials and other uses, and that its manufacture is a matter of deep interest to any locality that can produce the necessary raw materials.

The following raw materials are possible sources of magnesium metal; brines, dolomite, magnesite, brucite, and a number of other magnesium-bearing minerals. United States production at present is practically limited to the use of brines. Excellent possibilities are magnesite, dolomite, and brucite, in the order named. Cheap electric power is necessary to reduce the metal.

The Pacific Northwest is well supplied with magnesite from the quarries at Chewelah, Stevens County, Washington, north of Spokane. Flotation methods of purifying dolomite open possibilities for a large amount of Washington and Oregon dolomite. Cheap electric power should be available at Bonneville and Grand Coulee.

The greater portion of the bulletin is given over to a discussion of the various methods of winning magnesium from its raw materials. Brine is not available, at present, in the Pacific Northwest. The Experiment Station at Pullman, Washington, has conducted a series of tests to determine the most feasible and commercial method of reduction. A direct reduction of magnesia by carbon is particularly adapted to the treatment of high-grade magnesite, and less electric energy is required than for the standard electrolytic process. This process may eventually produce magnesium at a much lower cost than by the older methods. And furthermore, the magnesite deposits in the State of Washington are adequate to provide raw material for a very large production of metallic magnesium.

The various methods of production are discussed and conclusions given about the difficulties and advantages of each. The bulletin is somewhat technical in spots, but the lay reader can glean a deal of valuable information on this important subject. The bibliography is thorough and an asset to anyone who wishes to research this field.

The bulletin can be obtained by writing the Mining Experiment Station, State College of Washington, Pullman, Washington, in care of Dean A. E. Drucker, and enclosing 35¢.

R. C. T.

* * * *

H. F. Dake	:	The Quartz Family of Minerals;
Frank L. Fleener	:	Whittlesay, $2.50.
and	:	
Ben Hur Wilson	:	

This book, with profuse illustrations in both black and white and color, will be invaluable to both the amateur and the professional student. Those who have a passion for collecting stones merely for their beauty will learn, through this volume, that the lowly agates with their variety of pictures and rich coloring, jasper, onyx, carnelian, amethyst and opals, are all quartz. In fact most semi-precious stones belong to the great quartz family, for quartz, in its various forms, composes about one-eighth of the earth's outer shell.

The chapter on localities where gem quartz may be found will be of special interest to local collectors, for Oregon and other western states are rich in specimens. The lava fields of eastern Oregon and the ocean beaches have yielded literally tons of quartz gems.

The authors remind us that dating as far back as the old stone age, some 100,000 years ago, quartz has played an active part in man's history, because of its hardness and durability, as well as its beauty. As man moved on into civilization, the semi-precious stones adorned the rich, until wars were waged and new worlds discovered in man's desire for them.

Mr. Dake, one of the co-authors, is a Portlander. He is editor of The Mineralogist, and a past president of the Oregon Agate and Mineral Society.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed

PORTLAND OREGON

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. No 17 Sept-1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

EDITOR:

Edwin T. Hodge,
2915 N.W.Luray Terrace,
Portland, Oregon.

BUSINESS MANAGER

Raymond L. Baldwin
2725 N.E. 50th Avenue
Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * * *

Lectures

Friday Sept. 9 : John Eliot Allen, Field Geologist of the State Dept. of Geology and Mineral Industries, will lecture on "Chromite Deposits in Oregon". Mr. Allen was connected with the Rustless Mining Corporation for several years, and during this time he became an authority on Oregon and California chromite. His report on the Oregon chromite deposits has recently been released by the State Department of Geol. & Min. Ind as bulletin #9.

Friday Sept. 23 : Dr. Warren D. Smith and Professor Lloyd Ruff will discuss the geology of the Wallowa Mountains. Dr. Smith was in charge of the State Dept. of Geol. & Min. Ind.'s mineral survey in that area this past summer. He will discuss the technical features of the report, assisted by Mr. Ruff, and the movies taken during the survey will be shown.

Friday Oct. 14 : Mr. Edward L. Wells, Meteorologist, "Forecasting the Weather".

Friday Oct. 28 : Mr. and Mrs. Chet Wheeler, "An Amateur Geologist's Vacation".

Field Trips

Sunday Sept. 25 : Klickitat "Dry Ice" wells, leader, Dr. J. C. Stevens. These wells release carbon dioxide that is used to carbonate beverages sold in Portland, and also to manufacture "dry ice". Should Dr. Stevens be unable to lead this trip, the Society will go into the Molalla area to a new fossil leaf locality, leader, Ray Treasher.

New Members

Grace Crieger
609 Bedell Bldg.
Portland, Oregon
Phone: BE 6623

NEWS OF THE MEMBERS

Dr. Edwin T. Hodge was the principal speaker at Mazama Lodge, Mount Hood, on September 3rd. The Mazamas were hosts to the Western Federation of Mountaineering Clubs, and some ninety delegates, exclusive of those from the Portland area, were registered. Dr. Hodge's address concerned the geology of Mount Hood, and was very timely, as Mount Hood is the birthplace and home of Mazamas, and Dr. Hodge is the foremost authority on the geology of Mount Hood.

METEORITES

"TIME" (Aug 29th, 1938, pp. 25 26) has a story entitled "Dollars from Heaven?", in which the Port Orford meteorite is discussed. Robert Harrison, a miner in the Port Orford district, claims that he can locate the meteorite, which at the base rate of $1 per pound, would be worth probably some $22,000. This is a lot of money in any man's country.

The Smithsonian Institute of Washington, D.C., has further complicated the situation by securing a formal searching permit from the U. S. Forest Service and they claim that the meteorite (as yet unfound) is their property even though it is located by private parties. Should such be the case, there will be a "lot of fun" if the Smithsonian presses its claim.

The Portland "Oregonian" of Aug. 28th carried a story by Dr. J. Hugh Pruett, Western Director of the American Meteor Society, relative to meteorites setting fire to trees. Dr. Pruett points out that meteors are heated during their brief passage through the earth's atmosphere but the brief flight does not allow heat to penetrate to the interior. Consequently they are not uncomfortable to handle even immediately after falling. There is no authenticated record of anyone's ever seeing a meteor set a fire. Dr. Pruett further suggests that a tree may be set afire by lightning, and if the interior slowly burns in an absence of oxygen, a large clinker may form. This clinker is frequently mistaken for a meteorite

NEVADA GOLD RUSH

High-grade ore that may develop a mining camp to rival the glory of Goldfield and Tonopah, has been discovered by E. M. Booth in the Cimarron District 29 miles north of Tonopah, Nevada. Some of this ore has assayed $2,000 a ton, which is $1 a pound.

The original discovery claims cover an area about one mile square. A 500 foot crosscut tunnel is being driven through the center of the rich claims, about 200 feet below the high-grade strike. From surface showings, it is concluded that the crosscut should tap five veins, and possibly two more. The claims have been purchased by Pacific Butte Mines Company for $185,000, and the company is headed by Fred Vollmar, veteran Silver Peak mine operator.

Oregon can boast no gold rush or gold camp of this size and nature, but there are several lode mines that are making substantial contributions to gold production. The chief of these is Cornucopia. Several dredges and placer operations within the State of Oregon should increase the gold yield by over 100 percent for the coming year.

INCREASED ACTIVITY OF GEYSERS

The activity of Yellowstone National Park's geysers is a constant source of interest to the tourist public, and some concern has been felt in recent years for the apparent decrease in eruption. This year, however, the geysers seem to have increased their activity; Old Faithful has spouted to a height of 223 feet, which is 73 feet above its 150 foot average. The Giantess has been erupting at double its normal rate. The Grand Geyser has been erupting at 30-hour periods, blowing water and steam 200 feet in the air. Park officials suggest that a shift in underground water flow may account for the renewed activity.

BERYLLIUM

The Metal That Slept A Hundred Years

F. W. Libbey
Mining Engineer, State Dept. Geology & Mineral Industries

Introduction:

The metal beryllium has had certain kinds of publicity in the past few years, that gives it a magic quality in the minds of many people. Rather vaguely it has been considered as something new, with amazing properties in connection with airplane construction, and that an ore containing beryllium must necessarily be very valuable. These are essentially misconceptions, and facts concerning the metal are of real interest and warrant attention.

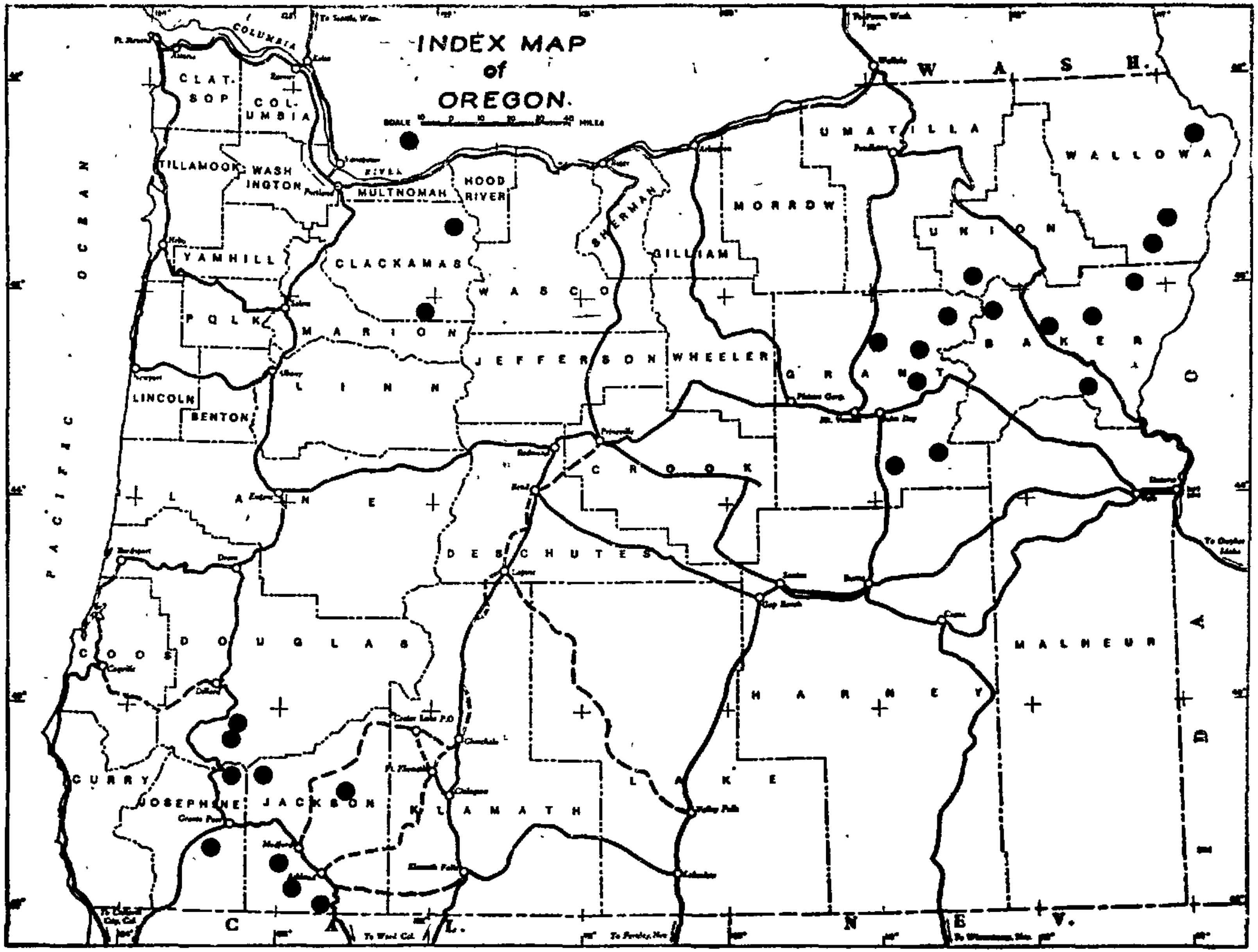
History:

In 1797, a French chemist, Vauquelin, working with the mineral beryl, discovered a new "earth" (beryllium oxide) which he called "la terre du beril". Since certain crystals of this new "earth" had a sweet taste, assistants of Vauquelin gave it the name "glucinum" from the Greek word meaning sweet.. However, the German translation of "la terre du beril" was "berylerde", and when the German, Wohler*, isolated the metal in 1827, he called it "beryllium". This is the name generally used, although in England and France the element is, to a great extent, still called glucinum.

It was early recognized that beryllium possesses valuable properties of hardness, rigidity and light weight; but the cost of production, and the fact that the world had not progressed to the point where an engineering material possessing these properties could be applied to any great extent, discouraged development. Scientists continued to investigate the metal and, especially in Germany, satisfactory methods of extraction were sought.

The study and application of special metal alloys were intensified early in the 20th century. In 1925 metallurgists of the Beryllium Corporation of America and the American Brass Co. recognized the hardening effects of beryllium in copper. It was not until 1926, after Dr. G. Masing and associates of the Siemens Halske organization in Germany discovered that, by certain heat treatments, these beryllium-copper alloys acquired remarkable qualities of high tensile strength and hardness, that the metal really became of commercial importance. Thus for a hundred years the metal was dormant, as far as its application was concerned, and then, rather suddenly, the discovery of this relatively simple treatment made it a highly useful engineering material. The re birth of the metal dates from the time of discovery of these heat-treatable characteristics, but it was not until 1932 that standard alloys were generally on

* Wohler in Germany and Bussy in France, working independently, discovered the metal at about the same time, but Wohler is generally credited with the discovery.



Areas favorable for Pegmatites.

the market. Only a small proportion of the costly metal is necessary to produce the highly desirable alloys, thus making them available at a reasonable price

Beryllium Metal:

The metal itself is steel gray in color and very light in weight, having a specific gravity of 1.84, or slightly higher than that of magnesium. It is very hard and possesses a rigidity greater than that of steel, but at room temperatures it is brittle. A prominent characteristic is its affinity for oxygen, sulphur, nitrogen and carbon, and the reaction with oxygen liberates a large quantity of heat. It has a permeability to X-rays seventeen times greater than that of aluminum, and it reduces all known oxides at high temperatures The expense of production precludes the pure metal having any commercial application except in restricted scientific fields, such as in X-ray technique and as a reducing agent.

Beryllium Alloys:

With the possibilities of beryllium-copper alloys proved and pointing the way, research was broadened to study the effects of the addition of beryllium to other metals and alloys with varying heat treatments. Combinations with other metals, even with silver and gold, are being investigated. Of special interest are certain beryllium-cobalt-copper, beryllium-nickel, and beryllium-iron alloys all of which are now being produced commercially. Germany leads the United States in the development of beryllium-nickel alloys which, with 1.8 percent beryllium, show values as high as 260,000 pounds per square inch tensile strength with 7 to 8 percent elongation.

Despite published statements concerning the importance of alloys of beryllium with the light metals aluminum and magnesium in aircraft manufacture, these combinations do not appear to have commercial importance at the present time. Small additions of beryllium to aluminum give products possessing no new advantage, and, due to the great difference in melting points of beryllium and magnesium, the latter boils before beryllium melts, so that the problem of forming alloys is difficult if not impractical.

The alloy of most commercial importance at the present time contains about 2.25 percent beryllium and the balance copper. It is far superior to other materials where a high tensile strength and ability to withstand repeated stress are essential. Combining excellent corrosion and erosion resistance with good electrical and heat conductivity, an ever widening field is opening up for its application in industry. As a spring material this alloy is in a class by itself, and it has been stated authoritatively that no other material is as dependable for the landing gear suspension springs of airplanes. Where high wear resistance is necessary, beryllium-copper appears to show a decided advantage over phosphor bronze, long considered the best material for such heavy duty, as the following test shows:

WEAR TEST **

Comparison of Wear of Beryllium-copper (2.25% Beryllium) and Phosphor Bronze (8% Tin) against Steel.

Size of specimen, in	2 x 3/4 x 1/2
Pressure, lb. per sq. in.	10
Speed at bearing surface, miles per hr.	10.3
Length of run, miles	200
Temperature, deg. C.	100
Lubrication	None
Wear rings	Steel 1/4 in.thick
Average depth of wear, in. Phosphor Bronze	0.03045
Beryllium copper as drawn	0.00530
Beryllium copper heat treated	0.00465

A recent application for the alloy is in forming moulds and dies, particularly in moulds for the plastic industry. In such use the high compressive strength together with the good flowing characteristics of the alloy give it definite advantages over mild steel moulds usually used. In this connection the following table is informative:

Approximate Physical Properties of Sand-cast 2.75 percent Beryllium Copper after Heat-treatment **

Ultimate tensile strength, lb. per sq. in.	150,000
Ultimate compressive strength, lb. per sq. in.	190,000
Elastic limit, lb. per sq. in.	135,000
Elongation, percent in 2 in.	1
Hardness, Rockwell C.	40 - 42

Among other uses in a constantly expanding field are tools such as hammers, chisels, wrenches, wrecking bars and drift pins, all of which are on the market; and because of their non-magnetic and non-sparking characteristics, they possess an obvious advantage in places where a spark might be disastrous, as around gas plants, oil refineries, and in coal mines.

Beryllium Oxide:

The field for beryllium in industry is not wholly confined to its use in forming alloys. Beryllium oxide has a melting point of 4,658 degrees F., and, in addition, has the useful characteristics of low density, good electrical insulation properties at high temperatures, great strength and resistance to thermal shock. It has had an outlet, restricted because of its high cost, for a number of years as a superrefractory in crucibles, electric furnace walls, vacuum tubes, and electric lamp parts. Sintered beryllium oxide is used as a high-duty abrasive for grinding hard alloys.

Market Prices:

Beryllium metal is not quoted by domestic producers, but master alloys with copper, nickel and iron are sold at from $30 to $40 a pound of contained

** Properties and Alloys of Beryllium, by Louis L. Stott: Am. Inst. Min. and Met. Eng., Tech. Pub. 738 (1936) beryllium plus the market price of the base metal. Recent quotations of the master alloy with copper give a price of $23 a pound of contained beryllium. Wrought beryllium copper in standard shapes and sizes is quoted at prices varying from 97¢ to $1.50 a pound. Beryllium oxide, fluffy, 99.8 percent, calcined at 1,450 degrees C. for refractory crucibles and electrical insulators is quoted at $4.00 a pound in 100-pound lots.

Beryl:

The only commercial ore of beryllium is the mineral beryl which is a chemical combination of beryllium, aluminum, silicon and oxygen. Mineralogically it is a combination of beryllium oxide, aluminum oxide and silicon oxide, or silica. The mineral formula is $3(BeO\ Al_2O_3)\ 6SiO_2$, and it is readily seen that, especially because of its light weight, beryllium forms a small proportion of the whole mineral. Theoretically, beryllium oxide is 14 percent of the whole, but because of impurities always present in the mineral, the percentage of beryllium oxide in the commercial mineral ranges between 10 and 13 percent. British India supplies the highest grade material which runs 13 percent; South African shipments run about 12 percent; South Dakota beryl contains from 11 to 11.5 percent.

When perfectly free from defects beryl becomes a gem stone, and the most highly prized of all gems is the green variety, the emerald, the color of which is due to the presence of a little chromium. Flawless stones of good color are extremely rare, and, according to Kraus and Holder in GEMS AND GEM MATERIALS, may cost from $1,000 to $10,000 a carat*.

At least as early as 1650 B.C. the emerald was mined on the west coast of the Red Sea by the Egyptians, and down through the ages has been surrounded by an aura of symbolism and superstition. The ancients believed that the emerald sharpened the wits, strengthened the memory, conferred riches, had power to heal diseases of the eye, and, especially, gave the power to predict future events. The beryl was supposed to give help against foes in battle, to promote amiability, energy and quick wittedness.

In Revelations of the New Testament the emerald, as well as the beryl, each symbolical of one of the twelve apostles, was one of the twelve foundation stones of the New Jerusalem. Emerald and beryl were two of the twelve stones designated by Moses to adorn the holy garments of the Jewish high priest, the twelve stones representing the twelve tribes of the children of Israel.

The Spanish conquerors of the New World found many fine emeralds among the treasures of the Aztecs of Mexico and the Incas of Peru; and they were guided in their looting expeditions as much by their desire for emeralds as for gold and silver.

Some emeralds of jewelry are entirely different minerals. The Brazilian emerald is a green variety of tourmaline. Lithia emerald is the

* The carat as a unit of weight for precious stones has been established by the United States Government at exactly 200 miligrams. This is slightly in excess of 3 grains. For precious metals, a carat is one twenty-fourth part, and is used to express proportion in an alloy; thus, in a gold ring, 18 carats means eighteen twenty-fourths of pure gold.

emerald-green spodumene, or hiddenite. The Oriental emerald is a green variety of sapphire, or corundum. Uralian emerald is the green andradite which belongs to the garnet group.

Other gem stones of beryl are the blue-green aquamarine, the honey-yellow golden beryl, and the very rare and beautiful morganite which is pale pink to rose red, the color being due to the presence of caesium. Incidentally, the gem collection of the elder J. P. Morgan, for whom this last mineral was named, is one of the largest of modern times. It is now in the American Museum of Natural History, New York.

With rare exceptions* beryl is found only in acid pegmatites, that is, granitic rocks, the constituent crystals (quartz, feldspar and usually mica) of which are distinct and of large, sometimes enormous, size. Lindgren, in his MINERAL DEPOSITS, cites an extreme example in the Ural Mountains where a quarry was opened in a single feldspar crystal. Pegmatites occur as veins, dikes and masses, and, generally, by one who knows granite, are not difficult to recognize. Prospectors for beryl should confine their search to pegmatite areas, and, in this connection, it would be well to bear in mind that pegmatites not only may contain the common minerals quartz, feldspar and mica in such purity as to make them of commercial importance in a favorable locality, but also are the mother rocks for the rarest minerals, some of gem variety, as well as tungsten, molybdenite and cassiterite (tin ore).

Aside from the gem varieties, beryl may occur in massive form, but commonly it occurs as dull or opaque, hexagonal, prismatic crystals. The color is usually pale green, but may be white, blue, brownish, or yellow. It is harder than quartz, which it resembles, and somewhat heavier. Usually the crystal faces have vertical lines, or striations, rarely transverse, while quartz crystals usually have transverse striations. These differences may not, however, be great enough to allow definite identification. Like many other minerals found in pegmatites, beryl crystals vary in size over a wide range, from microscopic to those of very large dimensions. A single crystal 18 feet long was found at Albany, Maine. A section of a crystal in the Boston Society of Natural History is 40 inches in diameter and 42 inches long. The crystal from which this part was broken measured 9 feet in length. Such large specimens are rare, but crystals a few inches long are not uncommon.

Other minerals containing beryllium are known, but, for the most part, they are rare and of scientific interest only. Phenacite, beryllium silicate, would be a highly desirable ore as it contains, theoretically, about 45 percent beryllium oxide. Moreover, there would be no expensive problem of separating beryllium from aluminum as there is in the treatment of beryl. Phenacite has been found in Colorado and Virginia; at Durango, Mexico, and near Ekaterinberg, Siberia, but there are no known commercial deposits. Beryllium has been detected in some mineral waters and, also, in samples of coal in Russia.

The detection of beryllium in a sample may be difficult. Except in the case of characteristic crystals, the spectroscope may be necessary to determine the element definitely. The analysis of beryllium ore and the quantitative determination of the metal require special skill; dependable results

* Crystals have been found in mica schist, in slate and in calcite veins.

can be obtained only in well equipped laboratories and by experienced chemists.

Occurrences:

Beryl occurs in many states of this country and in other lands. It is being mined in the Black Hills of South Dakota as an adjunct to lithium and feldspar production. A commercial deposit of recent discovery, located about 50 miles north of San Diego, California, is reported to be ready for production. In the Northwest, beryl is found in Latah county, Idaho. Industrial demand for the mineral is of such recent growth, that relatively little prospecting for it has been done. Moreover, the domestic demand is insignificant compared to that of the common metals. The United States Bureau of Mines, in the MINERALS YEARBOOK for 1937, states that no statistics of production are available in the United States or the world. Domestic consumption is increasing and is estimated at about 300 tons annually at the present time, with the probability that this will be increased to 500 tons in the near future. American production has been small, and most of the beryl consumed has been imported. British India supplied the bulk of our needs until 1936 when Argentina shipped in 162 tons valued at $6,681.

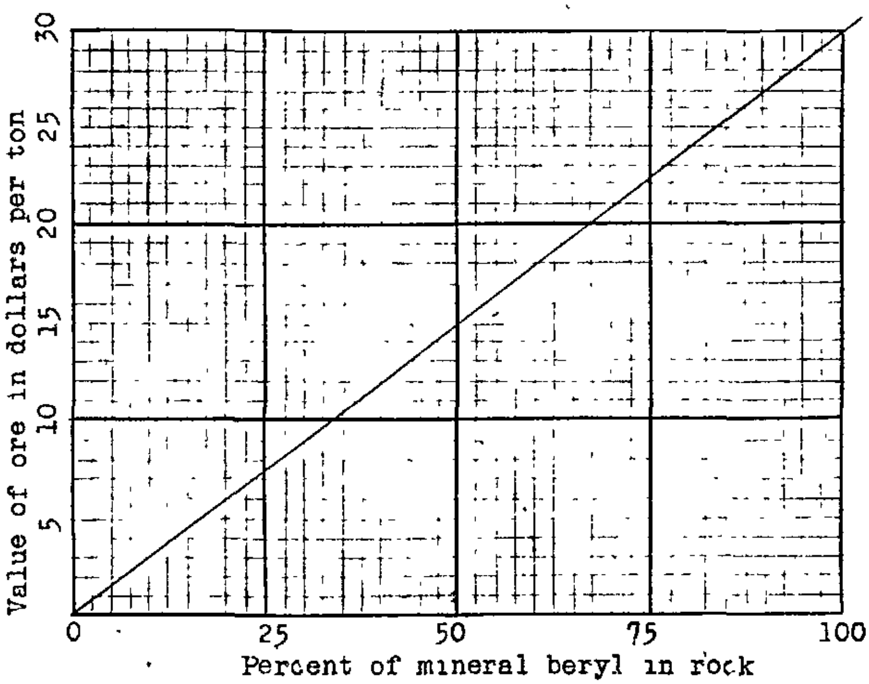
No commercial deposits of beryl are known in Oregon. There have been unsubstantiated reports of the occurrence of phenacite in Jackson county and an unconfirmed report of beryl from Clackamas county. Certain granitic areas in southern and eastern Oregon, as well as central and northern sections of the Cascades, are known to have pegmatites, and would be favorable localities for prospecting for beryl together with the other minerals mentioned as characteristically pegmatitic. These areas are indicated in a general way on the accompanying index map of the state. Undoubtedly there are areas other than those outlined which contain pegmatites. A large proportion of the state has never had detailed geological mapping, and only those districts which have had competent study are indicated on the map.

Economic Factors:

The nominal market quotations for beryl are $30 to $35 a ton f.o.b. mine for mineral containing 10 to 12 percent beryllium oxide. Since the theoretical percentage is 14, it is plain that only the clean mineral is marketable. Actual business would be subject to negotiation, and it is certain that a better price could be obtained by a producer who could make regular shipments than by one who could ship only an occasional small lot.

Beryl has not been found concentrated in pure form in veins, but as irregularly disseminated crystals or small masses in a gangue rock with other minerals. It is therefore necessary to concentrate the beryl in order to market it. This is commonly done by cobbing and hand-sorting; and usually a large proportion of waste rock must be handled to get the clean mineral. It has been estimated that, in the Black Hills, South Dakota, 50 tons of gangue are handled to obtain one ton of beryl. If the clean beryl contains 11 percent beryllium oxide, then the rock mined averages about 0.22 percent beryllium oxide. With the beryl selling at $32.50 a ton, this would be equivalent to 65¢ a ton for the beryl value of the original rock. This, of course, would be uneconomic if the rock were mined for beryl alone, and illustrates the desirability of investigating the economic possibilities of associated minerals in beryl occurrences.

The accompanying plat shows the different values which could be assigned to the crude ore for varying proportions of beryl in the rock. For example, if it is assumed that beryl is to be mined alone and that a concentrate containing 10 percent beryllium oxide would be worth $30 00 a ton, then for the crude ore to have a value of $10.00 a ton, it would need to contain 33 1/3 percent beryl; equivalent to 3.3 percent beryllium oxide, or 1.2 percent metallic beryllium. If a higher grade concentrate could be made, these figures would of course change somewhat. Mineral containing 12 percent beryllium oxide would be worth $35.00 a ton, and to have a $10 00 ore, the rock would need to contain 28.6 percent beryl.



Graphic representation of values of crude ore corresponding to different percentages of beryl in the rock, assuming that the commercial beryl contains 10% beryllium oxide.

Equivalent percentages of beryllium oxide and metallic beryllium for percentages of beryl shown in the graph are given in the following table:

Beryl %	Beryllium Oxide %	Metallic Beryllium %
100	10.0	3.6
75	7.5	2.7
50	5.0	1.8
25	2.5	0.9

Several facts in the present market situation seem evident. The demand is small and no large scale operations for beryl alone are warranted even if such a deposit should be available. If produced as a by-product or mined in conjunction with other minerals, then large scale operations with accompanying low unit costs might apply. Foreign sources can supply the domestic market so that there is no tendency towards a stronger market price, and the present price offers no great inducement to a producer unless beryl be incidental to other production. A deposit to be mined for beryl alone must be favorably situated and contain a large percentage of beryl to make it economic. At the same time an influencing factor is the possibility of finding gem varieties of beryl and other gem materials which might alter conditions and make a low grade deposit profitable. Aside from beryl, gem materials which may be found in pegmatites are: tourmaline, zircon, apatite, quartz, ruby, sapphire, spodumene, cyanite, topaz, rutile, phenacite, moonstone, spessartite, and diopside.

It is interesting to observe the great spread in price of the metal between the ore purchased and the marketable alloy. The quotation of $30 a ton for a 10 percent beryllium oxide ore is equivalent to 41¢ a pound of contained beryllium, while the selling price of the metal in its alloys is $23 to $40 a pound. This large difference may seem disproportionate, but it should be pointed out that beryl rarely yields over 3 percent metal, and this is obtained only after this refractory mineral has been subjected to complicated and small scale extraction processes which must be closely controlled, that it has been and still is necessary to carry on extensive research in connection with production methods; all these factors, together with patent rights, combine to make a high-priced product. The metal has been reduced in price from $200 a pound in 1929 to $23 at present, and doubtless this lowering trend will continue.

Production Methods:

While, outside of the industry, knowledge of details of production processes is meagre, it is known that both electric and nonelectric methods of reduction are used. In refining the metal and preparation of the alloys, as well as in heat treatments, electric furnaces are widely used.

Future Possibilities of Beryllium Alloys:

In their commercial application, how wide a field beryllium alloys will be able to cover is an interesting speculation. The two light metals, aluminum and beryllium, were both first isolated by Wohler within a year of each other; now the world production of aluminum is over 350,000 tons a year. This phenomenal development began fifty years ago when a commercial process of extraction was introduced, but especially in the past twenty years has the growth been rapid. Not a small part of that development has been due to educating the public in the advantages and use of the metal. While beryllium will have, apparently, a more restricted application than aluminum, the unique qualities of beryllium alloys, coupled with the constant search of industry for improved engineering materials, point to a probable great expansion in their use. Demand will increase as their qualities become better known and the price of the metal is reduced; conversely, the price can be reduced as the demand for the metal increases. In Germany and, probably, Italy, the application of these alloys has progressed faster than in this country, influenced strongly no doubt by the concentrated efforts of these countries in building up war machines.

Few people realize how important special metal alloys are to industrial progress. It is because of them that this modern world is able to have its present highly developed electrical, automobile and aircraft industries; to them we owe many of the machines and appliances so intimately connected with our daily life, and without them little industrial progress could have been made in the past thirty years. Their application is a direct measure of our so-called civilized advancement. To manganese, nickel, chromium, tungsten, vanadium, molybdenum and aluminum has now been added the old-new beryllium as a highly useful alloy-forming metal.

* * * * * *

PRODUCERS

Producers of beryllium products in this country are as follows:

Beryllium Corporation of Pennsylvania,
Temple, Pa.

Westvaco Chlorine Products Co.,
Chrysler Bldg., New York, N. Y.

Brush Beryllium Co.,
Cleveland, Ohio.

American Brass Co.,
New York, N. Y.

Riverside Metal Co.,
Riverside, New Jersey.

General Electric Co.,
Schenectady, N. Y.

Revere Copper and Brass Co.,
New York, N. Y.

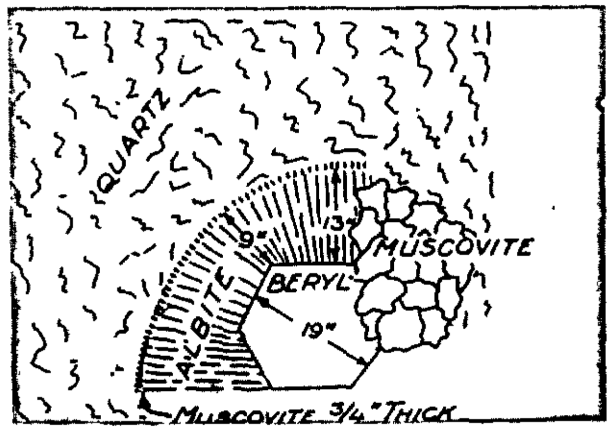
Beryl Metals Co.
Spokane, Wash.

Acknowledgements

The writer wishes to express his appreciation for information concerning granitic areas in Oregon given by A. M. Swartley, Consulting Engineer, and R. C. Treasher, Geologist, of the State Department of Geology and Mineral Industries.

Portland, Oregon
September, 1938.

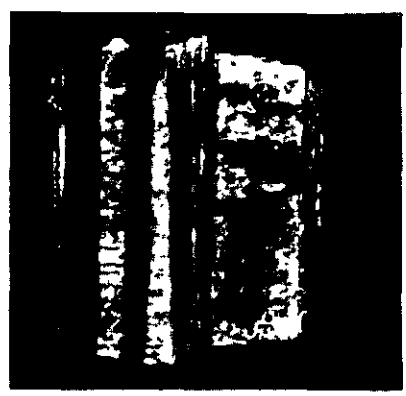
Beryl showing crystal form but with unreplaced core of potash feldspar. Old Mike mica mine near Custer, S.D.



Field Sketch of muscovite (mica) replacing quarts, with successive replacement by albite (feldspar) and beryl. Peerless claim, Keystone, S.D.

from
THE PEGMATITES OF THE WESTERN STATES
by Frank L. Hess in
ORE DEPOSITS OF THE WESTERN STATES
Courtesy of the American Institute of Mining and Metallurgical Engineers.

Beryl of Gem Quality
from
FIELD BOOK OF COMMON ROCKS AND MINERALS
by Frederick B. Loomis
Courtesy of G.P.Putnam's Sons, New York
Publishers



Beryl from Portland, Connecticut
Showing characteristic columnar grouping of hexagonal crystals
from
THE STORY OF THE MINERALS
by Herbert P. Whitlock,
Published by and courtesy of
The American Museum of Natural History,
New York.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 18 | Portland, Oregon | Sept.25, 1938

Official Publication
of the
Geological Society of the Oregon Country

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

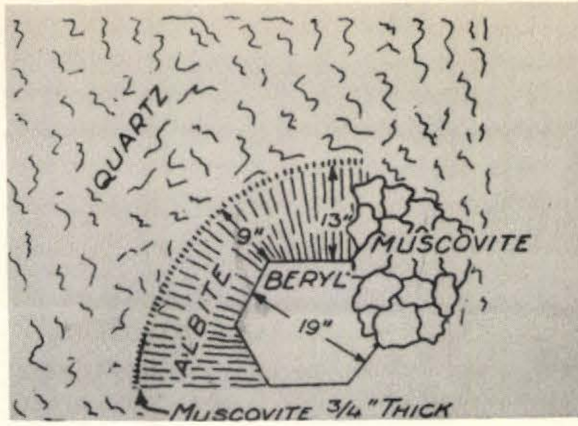
Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

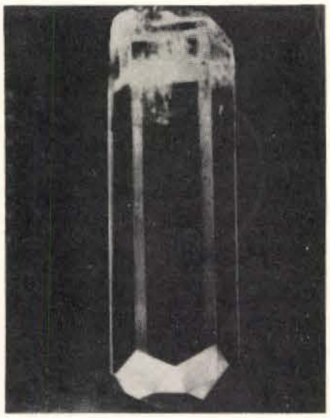
This publication is prepared by the Multigraph-Duplicator process.

Beryl showing crystal form but with unreplaced core of potash feldspar. Old Mike mica mine near Custer, S.D.

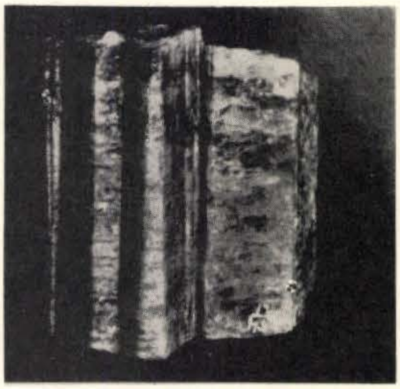


Field Sketch of muscovite (mica) replacing quarts, with successive replacement by albite (feldspar) and beryl. Peerless claim, Keystone, S.D.

from
THE PEGMATITES OF THE WESTERN STATES
by Frank L. Hess in
ORE DEPOSITS OF THE WESTERN STATES
Courtesy of the American Institute of Mining and Metallurgical Engineers.



Beryl of Gem Quality
from
FIELD BOOK OF COMMON ROCKS AND MINERALS
by Frederick B. Loomis
Courtesy of G.P.Putnam's Sons, New York
Publishers



Beryl from Portland, Connecticut
Showing characteristic columnar grouping of hexagonal crystals
from
THE STORY OF THE MINERALS
by Herbert P. Whitlock,
Published by and courtesy of
The American Museum of Natural History,
New York.

* * * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * * *

Lectures

Friday Sept. 23	:	Mr. Edward L. Wells, Meteorologist, will discuss methods of forecasting the weather. Mr. Wells has been in charge of the Portland division of the Weather Bureau for many years and his forecasts of weather conditions are the ultimate in accuracy. Mr. Wells has appeared before the Society in the past and his talks have been most interesting.
Friday Oct. 14	:	Dr. Warren D. Smith and Professor Lloyd Ruff will discuss the geology of the Wallowa Mountains. Dr. Smith was in charge of the State Dept. of Geol. and Min. Ind's mineral survey in that area this past summer. He will discuss the technical features of the report, assisted by Mr. Ruff, and the movies taken during the survey will be shown.
Friday Oct. 28	:	Mr. and Mrs. Chet Wheeler, "An Amateur Geologist's Vacation".
Friday Nov. 4	:	Note the change in date. The second Friday in November is Armistice Day and the fourth Friday immediately following is Thanksgiving. It is considered advisable, therefore, to have only one meeting during November, and that will be on the first Friday of the month. The occasion will be a joint meeting with the Agate & Mineral Society. The place will be the same, Public Service Auditorium, 8:15 P.M. Dr. Edwin T. Hodge will give us a talk about Mt. Multnomah.

Field Trips

Sunday Sept. 25	:	Klickitat "Dry Ice" wells, leader Dr. J. C. Stevens. These wells release carbon dioxide that is used to carbonate beverages sold in Portland, and also to manufacture "dry ice". Dr. Stevens is consultant for the Company, and it will be a real treat to have him direct this field trip.
Sunday Oct. 16	:	Who Knows!! Trip Chairman Chet Wheeler states that he is having great difficulty in securing trip leaders. No leaders, no trips! Should we continue having field trips, or should we all sit back hoping that "George will do it"?

New Members

Herbert A. Peterson, Jr.
8659 S.E. Foster Road
Portland, Oregon
Phone: Sunset 2152 (Junior Member)

NEWS OF THE MEMBERS

Leo F. Simon gave an illustrated talk to the Forest Grove Garden Club on the "Conservation of Wild Flowers and Birds", August 25, 1938. Mr. Simon is president of the Audobon Society and a well-informed naturalist.

* * * *

The following item is extracted from the Oregonian, "Charles Frazier Booth, son of Dr. and Mrs. Courtland L. Booth of Portland, left Tuesday night for New Haven, Conn., where he will enter Yale University. Booth graduated in June from Lincoln high school where he took the classical and scientific course. He won the City of Portland scholarship to Yale this year, which is good for a four-year basic course. Three scholarships to Yale were awarded Portland high school graduates this year."

Charles Booth is a member of the Geological Society of the Oregon Country and although we hate to have him get so far away from the scene of Oregon Country geology, we congratulate him on his scholarship and wish him the best of luck at Yale.

* * * *

Mr. H. F. Travis has requested that his address be changed back to that of 5905 NE Milton Street. This must mean that he is back in town for the winter.

* * * *

Mr. and Mrs. Raymond L. Baldwin were hosts to the Geological Society at their new home south of Portland. They conducted personally directed "cook's tours" through their new house which certainly is a beauty. The Baldwins have a 900 x 325 foot lot - some 7 acres - (wouldn't it be nice to run a lawn mower over that?) and they plan on keeping the grounds as rustic and natural as possible. Mrs. Jessie Treasher "poured".

* * * *

DO YOU LIKE THESE NEWS NOTES?

These news notes do not materialize out of thin air, you know. It would take only a moment to call in and give your information and let the rest of the Society in on your doings. They are just as interested in your accomplishments as you are in theirs. (Ed.)

Address by
VISCENZO PETRULLO, Ph.D.
Ethnologist, United States Government

At the Meeting of the
GEOLOGICAL SOCIETY OF THE OREGON COUNTRY
Luncheon, L'Abbe Restaurant
August 18, 1938.

(Editor's note: This address was taken in shorthand and reproduced as such. It was deemed unwise to change Dr. Petrullo's style for fear of changing the thought. The reader should remember that this is not a prepared manuscript, but a transcription of a lecture).

. . . . . (first few words in regard to petrified forest in Oregon) . . . . . in whatever class the discovery of the petrified forest may be, I extend congratulations to you on having found something you have in such abundance. I, myself, ten days ago became famous - that is, famous to myself - and I'm proud of this discovery. In New Mexico were discovered trees embedded in sandstone cliff twenty or thirty feet below the surface. I was excited until I got hold of one of your colleagues who listened to my story and then said, "I have never seen anything like that before but it's very interesting".

Such discoveries lead me to suggest that you have a natural resource in your own state that you might want to exploit sometime. It is becoming as important in this country as coal, iron, copper and oil, or almost as important. A great many states are taking such areas of petrified forests and converting them into state parks for tourist attraction. This is an educational job also and you may be able to interest the state system to promote the preservation of such sites for educational purposes; the Chambers of Commerce will be interested in attracting tourist trade, and we are interested in preserving them for science' sake.

My own field is anthropology. I am interested in connection with our program in making use of WPA facilities to extend the educational services of the state in scientific fields to do original research in the various fields, and, perhaps, to develop a state museum system which will be a departure from the old idea that a museum is a place where a number of stuffed shirts get together occasionally and hold a tea to which a few bejeweled women come, and where they stored artistic specimens without relation to their scientific importance. We have gotten away from that idea and are supplanting it with the plan that a museum should be a large part of the educational system of the state for children and adults, and if you look upon it that way - just to have one museum - you ought to extend its services so that it can reach every school in that state. Or this can be done by establishing smaller museums in smaller communities.

This sort of thing would have been impossible a few years ago. When you have a two billion corporation such as the WPA whose main function is to find employment for people who do not have it, you have a means for extending these facilities and developing and even creating such facilities for your own people. You need, of course, a certain amount of sponsor's contributions. You can get together and develop a plan for your state.

I would like to go back to what interests me most, personally - original research. To finance research is an expensive thing with the result that only those institutions which are heavily endowed can support the efforts of a few scientists, whereas in those states where research is needed most, there is not an institution so endowed as to support that work. So far as I have been able to gather, there is no institution in Oregon, outside of universities and some colleges, who can support archeological, paleontological and anthropological research. Through WPA you can extend this work considerably.

Today in Texas there is a project employing 275 men on archeological research; in terms of actual dollars that may amount to $200,000. I do not know where in Oregon you could get a benefactor to supply $200,000 to carry on archeological research. You can get it through WPA for it so happens that in archeological research you don't need expert professional archeologists. Of course you do need men at the top who can direct such work. As long as you have a professional man who can direct the work, WPA can get white collar assistants to carry out the details. This may mean ten or fifty or $100,000 depending on your willingness to carry on research on any scale you think practical. This can be carried out in the field and in laboratories where material will be studied and analyzed, and also where pamphlets or books describing material gathered may be written and sent to schools.

My function is merely to call to your attention these projects which are in direct line with your own interest and work out a project on which WPA workers could be employed. The end product would be a good sound scientific collection which would be a great benefit to your citizens. Probably something that is bothering you is how WPA workers can assist in research. If you ask a geologist who is sixty years of age, he will say he cannot use WPA workers. His whole experience has been such that he doesn't mind spending time writing or cataloging his own notes. What we can do is to give such a person some workers for laboratory assistants who will free him from mechanical tasks. His time should be spent in analyzing material - not in mechanical work. I admit that WPA workers are not as efficient as some you may employ. You may occasionally get a WPA worker like the three carpenters who were putting up a building. One stopped suddenly and looked at the nail in his hand and said, "Something is wrong here" and called Pat over and said, "Look here! You know that government of ours in Washington is beginning to ship nails with points on the wrong end."

Pat looked at it and said the point was on the wrong end all right. After much discussion they called their foreman over and said, "Come over and look at this. How do you expect us to work when the government hasn't even sense enough to send nails with the point on the right end? It's getting so a man can't do his work any more . . . (and so on.) . . .

Sam scratched his head and was stumped for a minute too. Then he burst into a line of profanity which I won't repeat because there are ladies present and said "You dumb so-and-so! That nail don't belong in that wall, it belongs in this wall over here."

Occasionally you may get such a nail. However, we have large archeological projects doing excellent work in various states. Georgia received one-half a million dollars of WPA money to study mounds, especially located around Macon, and have done an excellent job there. The National Park Service

is taking it over as a national park. In Tennessee there is a project of this kind in connection with TVA. The universities of Alabama and Tennessee have had a number of archeological projects and have spent $300,000 in the form of labor and have accomplished a remarkable thing - a whole river valley has been studied - with some of the mounds showing fourteen layers of culture, some of people who didn't know the use of pottery. That places the period rather far back. In Louisiana we have equally large project; in New Jersey one project has been going for two years.
. . . trying to determine whether there are any human remains in glacial sands and in a week or so I am going to Montana to look over the project there. Wyoming is going to write up a geological project - possibly paleontology and archeology. We are spending more money in this country on archeological research than Europe and Asia together.

In Oregon you have some very important sites. Geologically this area is very interesting. I don't think you will find remains of very early man here but you will find cultures which will be an important link in the history of man and the world.

We are getting away from the idea that an archeologist should not call upon the assistance of other scientists. Today practically all the projects have a geologist so that if he comes upon data which needs geological interpretation, he will help. These projects will not operate, incidentally, unless there is a technical staff to direct the works, that means for every ten or fifteen untrained people there must be one professional geologist or archeologist, so that if you do have a project with a hundred men, you have a staff varying from five to ten who will be busy analyzing and directing the work. On that basis WPA projects in these fields are not boondoggling projects at all, but are strictly scientific projects supervised by professional scientists, and you will see that this is the only way we actually can justify the expenditures of such huge sums of money. There can be no political or amateur interference with it. These projects call for such huge expenditures that they must serve the public need, actually do scientific work and find a way to get it to the public.

I have come to Oregon and met here without knowing exactly what your interests are. I may have wandered far afield. I hope it is not lost if I have given you some idea of the opportunity that exists today if you are interested in archeology, paleontology, geology or any other kind of research. You might write up a project and develop a geological laboratory and develop a geological museum in time. That depends largely on your interests. We in Washington are anxious to serve your needs and I am here not to make this long rambling speech but to find out what your needs are, and if we can assist you, we are only too happy to do so.

Later.

I think that a museum will come eventually. WPA will help build a museum and perhaps you will find money to maintain it. The construction of dioramas which would show geologic formation in the state could be done with a small contribution and could be put into schools and in local museums in state-wide projects. You could arrange collections which could be circulated around the schools, write pamphlets primarily for the school child. You also could have a geological project to collect, label and study collections, perhaps with the university or some other state organization. I do not know which organization would be the better equipped in the field of geology and paleontology. Archeology and historical research also. In some instances you could create through WPA a research center and guiding center which might be the beginning of an organization or institution later on. Building of a geological museum will come after a while. Get your citizens stimulated to where they think this is a necessity to their cultural life and they will get it.

OREGON ROAD MAPS.

Modern auto transportation has made the layman, man on the street or in an auto more map conscious. True enough our highways are so well marked as to routes - directions and distance that we use them a great deal without maps but with today's super service stations, with free water, air, etc., we also get free maps and sometimes as many as we can carry away. These tell us where to find some (not many, however) geological features, where to park our trailer and show us the more traveled roads and many scenic points of interest. Many of the roads, streams, improvements, etc., that interest the members of the Geological Society of the Oregon Country have not been obtainable in the past from any single map or source and much of the source data was in error. This condition has existed for years and has affected other groups, business and even highway planners and officials far more than our three-year old society.

Something is being done about it and the important thing is that the men who plan and build our highways, make traffic counts and in all manner of means endeavor to plan our highways for the future use and needs of the tax payer (and others, if such there be) are making the maps and doing a good job of it too.

Congress in the Federal Aid Highway Act of 1937 authorized and appropriated sufficient money to make a nation-wide highway planning survey. This survey will probably cost $25,000,000, of which the states will contribute $10,000,000. The work is being done by the various state highway commissions in cooperation with the U. S. Bureau of Public Roads and the product of their work is called the "State-Wide Highway Planning Survey". Five sets of maps are being prepared, namely: general highways and transportation, bus and truck routes, school bus routes, traffic stations and postal routes. The first of these, which is probably the most important, is being mapped generally to a scale of 1 inch equals 1 mile with congested or populous areas on a larger scale. The maps are produced by counties with a sufficient number of sheets to limit them to a reasonable size. (Harney County, Oregon, has 13). The sheets for Oregon are 30 x 40 inches in size, 142 sheets being required for the state. These maps show 60 symbols or features, such as roads, bridges, camps, lodges, mines, quarries, dams, farm houses, etc., even to Mr. Hancock's Zig Zag Villa, plus 14 features for structures or improvements not in use. They are so complete that they seem to show everything except the chicken coops and gas (service) stations.

THESE MAPS have been compiled for State, Federal and other uses and <u>ARE NOT AVAILABLE TO THE PUBLIC</u> (who did foot the bill though). However, there is a feeling that if sufficient interest develops there may be ways that the general public (you and I) can benefit from them; for instance, the public library could no doubt get a set (the 142 Oregon sheets cost $130) if they found sufficient demand for them and various non-profit, public, research, recreational and scientific groups might be able to secure them if the matter were undertaken in the proper way.

These maps will probably be revised periodically and as time goes on may become the standard map for detail reference purposes, (save for topography which they do not show).

In Oregon the cost of the work of compiling checking and mapping the data without supplying copies to other state departments will total more than $500,000.

Do you remember Lewis A. McArthur's lecture before the Society June 26, 1936, on the subject of mapping? It looks like his unfailing efforts and pleas for bigger and better maps for the Oregon Country are beginning to start, to fix, to commence to be realized.

Anonymous.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed

PORTLAND OREGON

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 19 Portland, Oregon Oct. 10, 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscriptions. $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * *

Lectures

Friday Oct. 14 : Dr. Warren D. Smith and Professor Lloyd Ruff will discuss the geology of the Wallowa Mountains. Dr. Smith was in charge of the State Dept. of Geol. and Min. Ind.'s mineral survey in that area this past summer. He will discuss the technical features of the report, assisted by Mr. Ruff, and the movies taken during the survey will be shown.

Friday Oct. 28 : Mr. and Mrs. Chet Wheeler, "An Amateur Geologist's Vacation".

Friday Nov. 4 : Note the change in date. The second Friday in November is Armistice Day and the fourth Friday immediately following is Thanksgiving. It is considered advisable, therefore, to have only one meeting during November, and that will be on the first Friday of the month. The occasion will be a joint meeting with the Agate & Mineral Society. The place will be the same, Public Service Auditorium, 8:15 P.M. Dr.Edwin T. Hodge will give us a talk about Mt. Multnomah.

Field Trips

Sunday Oct. 16 : Leader, A. D. Vance. Tualatin-Nehalem trip. - Leaving Southwest 6th and Yamhill at 8:30 A.M., the caravan will go out Cornell Road and Thompson Road to Bonney Slope. From there on, the group will have a "follow the leader" trip. A group of large erratics on the Henry Bower farm will be viewed and then the caravan will be led through North Plains, Banks, Buxton, and Vernonia, to Rock Creek. About six miles up Rock Creek a deposit of fossil-bearing Keasey shales will be visited and lunch will be eaten at a picnic ground nearby. After lunch, Pittsburg Bluffs will be visited and the return will be made by way of St.Helens, passing through some of the Columbia County lateritic soils, and iron country. The objectives of the trip will be to point out some of the Tualatin-Nehalem area problems and possibly start some arguments.

Sunday Oct. 30 : Leader, Dr. Clark of Willamette University, to fossil beds in the vicinity of Salem, and a study of a recent lake bed.

New Members

Mr. Henry Jullum
6035 S.E. Center St.,
Portland, Oregon

Dinner for Doctor Smith

To allow G.S.O.C. members and their friends to meet with Doctor Smith and Professor Ruff, a dinner meeting will be held previous to the lecture, Friday evening. Definite place has not yet been assigned but will probably be the Roosevelt Hotel, 6:15 P.M., and the price will be moderate. Telephone reservations to Mr. Treasher, Broadway 2276.

NEWS OF THE MEMBERS

Mr. A. M. Swartley of the Oregon Department of Geology and Mineral Industries spoke at a meeting of the Oregon Agate and Mineral Society in the Chamber of Commerce Building, October 7th. His subject was concerned with the study of minerals.

Mr. Phil Brogan had a feature article in Sunday's Oregonian (Oct. 9th) entitled "Old as the Hills - and Older, a story of primeval catastrophe revealed by Denuded Trunks". Mr. Brogan describes the petrified trunks of the Ashwood area and elsewhere with a style that is very pleasing as well as authoritative. Mrs. Louise Brogan presented a story on Meteorites, and the possibility of their setting fire to trees, in the Sunday Journal (Oct 2d). Both of these articles are worth reading and preserving.

Mr. and Mrs. Ray Treasher took a portion of their vacation during the past week, taking in Crater Lake, and the Bend area. Phil Brogan was visited at Bend and made many suggestions that helped their vacation to be more interesting. They are convinced that the Bend area is entirely underrated as a vacation area. A carload of rocks is one of the more concrete evidences of their adventures with snow storms, rain, sleet, freezing, and what-have-you.

AGATE AND MINERAL SOCIETY CONVENTION.

The Oregon Agate and Mineral Society is host to the Federated Mineral Clubs of the Northwest, during this coming week end. Mr. Rockwell, president of the Agate and Mineral Society and G.S.O.C. member, has made special arrangements for G.S.O.C. members to see the collections Saturday afternoon instead of Sunday, in order that they may attend the Vance field trip Sunday. The mineral collections represent the best in the Northwest, and there will be displays by commercial organizations as well. The exhibits will be held in the Multnomah Hotel.

The Convention and exhibits cannot be recommended too highly, and all who are interested in minerals will wish to see the displays.

LUNCHEON NOTES.

Mrs. Courtland Booth presented each member with a concretion which was collected in the Grays River country, Washington, at the luncheon of Sept. 29th. Dr. Booth insisted that Mrs. Booth cleaned the basement, but somehow we felt that he was just jealous because he hadn't thought of the presentation first. Many thanks, Mrs. Booth, and we hope that you "clean the basement" often.

- - - - - - - - -

WASHINGTON FOSSILS.

Fossil remains of a mammoth and a camel were excavated during the construction of tunnels for the Roza division of the Yakima project in Washington. In one of the two tunnels completed last May by Morrison-Knudsen Co , the trunk of an old tree was found buried in sand under 2000 ft. of lava. (R.E.M.)

From - Western Construction News
September 1938, page 334.

WEATHER FORECASTS

Edward L. Wells
Senior Meteorologist
U. S. Weather Bureau
Portland, Oregon

Probably one of the first uses of human speech was to make some remark about the weather. Most ancient literature is filled with references to the weather. An exception is said to be the literature of Egypt, for Egypt has little rain and the changes in temperature from day to day are of little concern.

An example of ancient interest in the weather is the Tower of the Winds, in Athens, erected about 100 B.C. This tower has eight sides, on each of which appears the Greek name for the wind which comes from that direction, together with a figure typifying the weather brought by that wind.

Aristotle wrote at length regarding the weather, and attempted scientific explanations for some of the phenomena. His discussion of meteorology was not greatly improved on for 2,000 years.

One reason for the slowness in making a scientific study of the weather was the lack of instruments for measuring weather elements.

The wind vane is probably the oldest of weather instruments.

A rain gage was developed by Castelli, in Italy, in 1662, but there are evidences of the existence of a crude rain gage in Korea a century or two before this. The rain gage was introduced into England in 1677, and into America in 1738.

A rude clinical thermometer was designed by Galileo and Sanctorius, in 1593 but the thermometer did not come into general use for taking outdoor temperatures until our present thermometer scale was established by Fahrenheit, about 1714.

The first barometer was made by Torricelli, in 1643.

Aristotle organized a weather reporting service, but not much more was done along that line for many centuries. Beginnings were made in Italy in the 17th century and in Germany in the 18th. Benjamin Franklin made valuable studies of the movement of storms in this country through the cooperation of the colonial postmasters in the 18th century.

The 19th century saw great progress in meteorology. The names of Redfield, Espy, Maury, Ferrel, Henry, Abbe, and Lapham, all Americans, stand high in the list of those who contributed materially to the advancement in this science, either in scientific investigation or the cultivation of public interest, or both. The invention of the electric telegraph in 1844 opened the way for the making of weather maps from current observations.

The first Government meteorological service was organized in France, in 1855; the services in England and Holland got under way a short time later.

Our own meteorological service, at first a branch of the Army Signal Corps, began operations November 1, 1870, and was transferred to the Department of Agriculture, under the name Weather Bureau, July 1, 1891.

The original staff included few men of scientific training. The field personnel was largely made up of enlisted men, who could operate a telegraph key keep a telegraph line in repair, and take the necessary routine observations. It was soon recognized, however, that forecasting the weather is a highly technical matter, and the method of selecting employees was changed accordingly. Nevertheless, until recently, the Weather Bureau has had to train its own men, for the most part, in the absence of opportunities for such training in the schools. Now, while practical experience in forecasting is still essential the finest kind of technical training is available in several institutions of higher education.

When the meteorological service was first organized there were 22 stations. Not one of these was in the Pacific Northwest. The Portland station was established a year later Now we have about 260 first-order stations, manned by trained, full-time men. There are hundreds of second-order stations manned by local personnel, taking and telegraphing regular observations, most of them at least every six hours, day and night. In addition to these there are several thousand stations of other types, which there is now not time to describe.

At the city offices, such as the one in the Custom House at Portland, a very large variety of work is carried on. Only a small part of the time is devoted to preparation of forecasts, but that is all there is now time to describe.

Our office is opened, every morning of the year at 4 o'clock. The observer who reports for duty at that time first looks over the various instruments to see that they are all operating properly. Then at 4:10 he begins the morning observation. In the interval between 4:10 and 4:30 he must read the barometer, correct the reading for temperature and reduce to a sea level equivalent, read several kinds of thermometers, determine the dewpoint, relative humidity and vapor pressure of the air, measure the fainfall if any, note the direction and velocity of the wind and the amount, kind, and movement of the clouds, and embody all these items in a coded message which must be on the wire for Chicago at exactly 4:30.

As this message goes out, similar messages from other places begin to arrive; some by Western Union from Chicago, and some over the teletypewriter system operated by the Civil Aeronautics Authority The observer at once begins to translate these coded message and enter the data on a large outline map of North America and the northeastern Pacific Ocean. A little later other men report for duty and work is continued on this and some supplementary maps. When I arrive at 7 A.M. the maps are usually nearly complete, presenting a picture of conditions over this vast area, not only at the surface, but to a limited extent in the upper air.

From these maps the forecast is prepared, but it is not released to the public until it is compared with a forecast made by a highly trained forecaster at San Francisco. The forecasts may go wrong, and they do so in a small percentage of cases, but it is not because of any lack of careful consideration of the information available.

While forecasting is highly technical, and will become more so as our facilities for exact measurement over wider areas and to greater heights increases, there is nothing mysterious about it. Because the air in the tropics becomes much warmer than that at the poles; and because air over the ocean is warmer in winter and cooler in summer than air over the land, great airstreams are developed as nature tries to overcome this inequality. Because of the rotation of the earth, and to a limited extent because of the influence of topography, these airstreams do not move directly from pole to equator or from ocean to land, but develop great eddies. Our weather map tells us something about these airstreams and the eddies formed by them. Forecasts of temperature are based on the opinion as to whether we are to be affected by a cold airstream or a warm one. It is not so simple as that, but that is the major factor. Forecasts of rain are based on what is expected in the way of lifting of moist air masses, either as these airstreams interact on one another or as they blow up mountain slopes, for practically all precipitation forms in rising masses of air. All these things must be taken into consideration, and it has to be done quickly, for every morning before the map is complete inquiries begin to come in by telephone.

While great progress has been made in recent years in our knowledge of the storm processes, factual data are still many times insufficient to give all the factors necessary for accurate analysis of existing conditions.

Much improvement in this respect is hoped for when it becomes possible to establish a much larger number of radio-meteorograph stations.

The radiometeorograph is a device for measuring various weather elements and transmitting the result of these measurements by radio. When one of these instruments is sent aloft, carried by a small balloon, the radio impulses are received and recorded at the ground. This equipment has now reached the practical stage, and further extension of its use is merely a matter of funds to cover the cost.

The forecasts are put to practical use in an almost infinite variety of ways, all the way from drying the Monday wash to the building of a great dam.

The forecasts are available to the public in many ways. They are printed on the daily weather map, which can be mailed to any address at a cost of 20 cents a month. Many business houses, rather than wait for receipt of the map by mail, call at our office for it, taking it fresh from the press. The forecasts are carried by the daily papers, and are given wide distribution by radio. The morning forecasts issued at Portland go out regularly every weekday morning over KOIN, KALE and KXL about 8 o'clock. The 7:55 AM broadcast over KXL originates in our office, and includes a summary from the morning map as well as the forecast. The This and That program, over KOIN, which beginning next week will be moved to 8:30 AM, has for years included a running story of the morning's weather, with the forecasts.

Persons having particular need for the forecasts do not depend on the general means of distribution, but call the Weather Bureau office, explaining their problems, and asking for the specific information needed. In periods of particularly unfavorable weather we frequently keep two telephone lines constantly busy, answering such calls.

In addition to the general forecasts there are specific forecasts to cover definite needs. Whenever the weather is expected to be particularly bad for live stock, special warnings are sent to certain points in eastern Oregon, to be relayed to stockgrowers. Warnings are displayed at coast ports whenever storms threaten navigation. There is a special fruit-frost service, operating through the winter in California and Florida, and in the spring in Oregon, and Washington, in those areas where orchard heating is practiced. The fruit growers pay a part of the cost of this service. Of particular importance in the Pacific Northwest is our fire weather service, devoted to helping the forest protective agencies in preventing and suppressing forest fires. A feature of this service is a mobile forecast unit, mounted on a truck. This can be taken to any part of the State where there is a serious fire, to keep the men on the fire lines informed as to any expected changes in the weather.

In recent years the most rapid development in specific weather service has been in connection with aviation. More than sixty of the first-order stations of the Weather Bureau are located at airports, and the entire attention of the men at those stations is devoted to the service of air transportation. Many of the large number of substations already referred to have been established and are maintained directly in the interest of the airway service.

The first-order airway stations and many of the substations never close. The first-order stations and many of the substations are connected with one another by means of a teletypewriter service, maintained by the Civil Aeronautics Authority. Complete forecast maps are made every six hours, and less complete maps at intermediate three-hour intervals. Hourly reports are received from stations along nearby air routes. Frequent observations by the use of balloons give the direction and velocity of the wind at various upper levels, and these are exchanged by teletype. Certain observations made by pilots also are available, together with a few widely scattered observations made by the use of radio meteorographs or by observers in airplanes. This means that when a pilot takes off on a scheduled flight on a designated airway he does so with complete information as to existing and expected weather along the line of flight. The great advance in the regularity and reliability of air mail and transport in recent years has been due in part to the development of better planes and more highly trained pilots, but it has been due in a very large measure to the service rendered by the Weather Bureau.

Those of you who have any problems in which the weather or climate may be a factor are invited to call at the Weather Bureau office and let us talk it over with you.

- - - - - - - - -

ORIGIN OF THE WILLAMETTE VALLEY

by Dr. Edwin T. Hodge
Professor Economic Geology
Oregon State College

A grisly white-haired, senile great-grandfather mosquito rested in the sunshine on the petal of an enormous sunflower plant. He was speaking, with the wisdom which comes with age, to a young strapping mosquito. This young strapping mosquito was feeling rather important since he had just been privileged to leave off his larva or wiggler clothes and now for the first time was sporting the clothing of a full fledged man mosquito. Feeling his importance, the younger mosquito had been making some observations on the world in general. "Don't you believe it", said the time-scarred grandfather mosquito. "I've lived on this sunflower nigh on five days - in fact, I was born in a pool of water at its very base. Throughout all my youth, manhood and down through the hours until I reached this venerable age of five days have I dwelt in the vicinity of this sunflower. On this sunflower I raised your father and on this sunflower you were born. As I said, don't you believe it when people tell you that this sunflower once was a little grain planted in the ground and has grown from that to this great six foot sunflower plant. I have lived here all my life. This plant was just as it is now when I was a child playing around in the mud pond and has not changed a nary bit in all these long hours."

Such might be the conversation between an aged mosquito and a younger one and such is the daily conversation between humans regarding the transformations that take place on the face of the earth. "The everlasting hills" is a poetic expression and was only intended to mean "everlasting" insofar as man's ephemeral existance is concerned. From the standpoint of a geologist reading the history of the world as shown by geological events, the hills on their part rise and fall in a manner not unlike the waves of the sea. The relentless, persistent and aggressive agents of destruction, such as the wind, the water, plants and animals, are forever destroying all land masses which stand above the level of the sea. In due course of time, with no interfering events, they will be reduced to a common level - the level of the ocean.

These remarks are necessary as a prelude to a discussion of the origin of the Willamette Valley because in this discussion land masses have been pushed up above the level of the sea and lowered again by Nature's destructive forces. The origin of the Willamette Valley should be a topic of intense interest to all tourists or others who travel up and down its highways. The valley "where rolls the mighty Oregon" was the objective of those hardy pioneers who fought the desert and the mountains in their westward push. It has become the home of over half the population of the state of Oregon. Within its boundaries flourish most of the industries and upon its geological origin and history depend our future economic and social life. Such vital questions as the control of the destructive floods which annually ravish the valley, the reclamation of over fifty percent of its bottom lands now wasted, the possibilities for petroleum, and other economic products beneath its sloping walls, and similar questions are dependent entirely and alone upon a correct interpretation of its geological history. It will not be possible in this brief article to answer these questions, nor even to tell the story of its fascinating history in detail. Perhaps in some future article I may be privileged to do this.

To thoroughly understand the history of the Willamette Valley we must begin about ten million years ago. At that time all of Oregon, with the exception of a great mountainous area in the northeast and another in the southwest was beneath the Pacific Ocean. An arm of this sea extended eastward and pounded against a shore line on the western side of the youthful Rocky Mountains. All during the first stage, which we will call the Eocene, the rivers winds and volcanoes carved away the uplands and carried the results of their destructive work into the sea. All through this long period the sea was filled by sands and muds. The filling of this sea continued until all of the Pacific arm was obliterated and there was left two badly eroded highlands standing above a great coastal plain composed almost exclusively of sandstones. These sandstones now constituted the main body of the coast range and formed the western slope of the Willamette Valley.

In the next period, which we will call the Oligocene, vulcanism broke out along a line of fractures practically coinciding with the present axis of the Cascades. From these volcanoes lavas poured out in all directions. These lavas built up the Cascade plateau to a moderate height and erected along the crest of this plateau a line of magnificent volcanoes. The volcanic ash and coarser fragments hurled out of these volcanoes was carried by the winds for immense distances. Much of it fell over the site of the present Willamette Valley and Coast Range. The lavas from the volcanoes did not reach more than thirty miles or so from the axis of the newly formed Cascade Mountains, but the ashes and coarser materials were spread out to the west as far as the present axis of the Coast Range. The volcanic debris transported for the most part by the wind gave rise to a great mantle of volcanic material which we call the Oligocene tuffs. Some of these tuffs fell into the sea because we find incorporated within them marine fossils. Naturally this tuff formation was thinnest along its western edge and thickest close to the Cascades. We are interested in this Oligocene tuff formation because of its weakness and ease of erosion. Its western exposed edge gave the initial Willamette River a north and south course of weakness upon which to develop.

In the next stage, which we will call the Miocene, vulcanism on a more extensive scale broke out along the Cascades. Immense floods of lava poured out in all directions. This lava issued quietly like the lavas which now issue from the volcanoes of the Hawaiian Islands. The volcanoes of the Oligocene, or preceding period, were explosive and more like those of Vesuvius. These Miocene lava floods covered practically all of Oregon with a pavement of basalt. To the east these floods rising from the Cascade and many other sources covered most of eastern Washington, eastern Oregon and much of Idaho and Utah. To the west they extended about ninety miles, or as far west as the present eastern crest of the Coast Range.

In summary to this point, we may say that covering all of western Oregon is a thick layer of Eocene sands now consolidated into resistent sandstones. Lying over them, but not extending as far west, are the soft Oligocene tuffs. On top of this soft formation lies the difficultly eroded basaltic lavas. All these formations at this period were lying flat.

The next chapter in our story is one devoted to destruction and not construction. During this period streams developed. These streams took, as all streams do, the shortest course to the sea. They extended down the western slope of the Cascades, flowing over first the Miocene lavas, then the Oligocene tuffs, and finally the Eocene sandstones on their way to the Pacific Ocean. These streams developed great transverse valleys, many of which still remain and among which we may number the Rogue, the Umpqua, the Siuslaw, and the Columbia.

Tributary streams to these main rivers developed on either side. Obviously those tributary streams which had the softest formations to work upon developed with greater ease. In this case the Oligocene tuff was the least resistant and on its exposed western edge the north and south tributaries of the original streams developed large tributaries.

The next event took place at the beginning of the Ice age about a million and a half years ago. It was an event which has given the dominant expression to the topography of Oregon . A great fracture was formed inland and parallel to the former coast. We can not say how far inland this fault or fracture was from the former coast, but I would surmise it to be about twenty to thirty miles inland. This fault resulted from an uplifting movement which had a tendency to elevate all of western Oregon. Since the movement could not elevate that portion which extended outward and beneath the Pacific Ocean and since the force was almost irresistible a break had to take place. Oregon might be looked upon as a great block of rock, the western edge of which has been raised so that the entire block tilts eastward. The edge of the block which faces west is called a fault scarp. The seward block tilted downward so that the waters of the Pacific Ocean were able to extend over it to the fault scarp.

The proof of this fault scarp is to be found in the almost perfectly straight course taken by the Oregon coast, and by the fact that this straight line cuts indifferently the soft sedimentary rocks of northern Oregon and the hard complex rocks of southern Oregon. Further proof is also offered by the actual presence of fault scarps still in existence and by the presence underneath the waters of the Pacific Ocean of the broken off seaward ends of those streams which once flowed westward from the crest of the Cascade plateau. These beheaded rivers are known as "submerged valleys".

The effect of this fault was to seriously derange the drainage. New streams immediately developed on the fault face. Only a few of the former westward flowing rivers were able to maintain their courses. Some of these masterful streams were able to deepen their valleys as fast as the fault block was slowly elevated. These streams are called "antecedent streams" and this explanation is the proper one for those streams which flow directly across the Coast Range mountains. Less powerful streams were not able to deepen their valleys, with the result that we see along the crest of the Coast Range saddles or depressions which represent their abandoned valleys. The inland drainage of the weaker streams was reversed and flowed eastward. Their course to east,. however, was hindered by thw estern edge of the Miocene lavas. At first, perhaps, their waters were ponded into lakes. These lakes grew in size until they spilled over their low divides to the north or south. This process continued until their waters found outlet in one of the masterful antecedent streams. After these waters had secured an outlet, the low divides were cut down and new streams developed with a north and south course.

The complete development of the north and south streams was perfected during the Ice age. During this period uplift continued and the masterful streams continued to have difficulty in maintaining their westward course. Under these circumstances that stream which was best able to maintain a deep valley across the gradually growing Coast Range was able to send a tributary south and one after another capture the waters of those streams which would not give an easy outlet to the sea. This process has continued to the present time. The Willamette tributary of the Columbia River now reaches as far south as Cottage Grove

We may now speak of the Willamette as a full fledged river. Its valley, however, was not where it now lies. The valley had a north and south course about twenty miles west of its present site. The valley was perched on the eastern side of the fault block hemmed in and lying upon eastward sloping rocks. The hard resistant Eocene sandstones formed the western slope and the immediate bottom of its valley. The river of course, could cut into these sandstones but found it easier to shift sideward down the sandstone surface slope by cutting away the soft Oligocene tuffs. During the first stage of its history its migration eastward was quite rapid since it had only to remove the Oligocene tuffs. When these had been removed to the place where they were overlain by the hard basalts, then this eastward shift was retarded. To move eastward it was necessary for the river to undercut the Oligocene tuffs on its eastern wall to such an extent that the lava rocks broke off and rolled into the valley. In some stages these broken off lava rocks covered the entire slope of the eastern valley and at these points the river had first to break up and transport away these rocks before further undercutting could proceed. This type of cutting is called "sapping", a term which all veterans of the world war will thoroughly appreciate.

The distance eastward which the valley has been able to shift by this sapping process is about ten miles. The eastward shift is facilitated by the work of large tributary streams which have cut valleys in the Cascade slope. For the most part, however, this movement is very slow and will proceed at an even decreasing rate in the future. We can almost say that the valley is now anchored along its present north and south course.

We have not space in this article to go into details about the many interesting and wonderful details of the Willamette valley There remain but two steps in its history which demand immediate consideration: During the middle of the Ice age the rainfall on the western slopes of the Cascades was about twice that of the present time. One result of this heavy rainfall was the development of glaciers on the Cascades. The main effect, however, was the erosion of the Cascade plateau and the bringing into the Willamette River of a tremendous quantity of silts. This silt or mud was easily carried by the torrential mountain streams, but it was impossible for the slower moving Willamette River to transport all the mud brought into it to the sea. Being a wise river as well as a member of the "Amalgamated Union of North American Rivers" the river refused to carry it and spread it far and wide over the bottom of its valley in the form of a flood plain. This was the silt which is destined to make the Willamette Valley the garden of the Pacific slope. This is the mud into which the early pioneers sunk to axle depth with their wagons. The magnificent Pacific Highway extends north and south for the most part over this flood plain.

We have now brought the story of the origin of the Willamette Valley to a close. It is a valley which has been determined by resistant sandstones beneath and on the west and resistant lava rocks on the east. It is a valley which started out as a number of tributaries of streams flowing westward to the Pacific Ocean. These tributary streams severed from their parental streams gained an outlet to the sea by uniting with one masterful stream and developed a new river. The process is not unlike that which one observes among a number of weaker railroads which, joining with one large railroad, develop into a masterful railroad system.

* * * * * * * *

FOSSIL FISH BEDS

E. N. Bates

On a recent trip through southwestern Wyoming over U. S. highway No. 30-N., about 13 miles west of Kemmerer, we began to notice highway signs that advised us of our approach to a notable fossil bed near the highway. The road map we were using carried a note which said "Fossil fish entombed in volcanic ash, one of the world's greatest fossil fish beds".

Although we do not claim much knowledge of such deposits, this note increased an interest in fossils we had already acquired through a (somewhat inactive) membership in the Geological Society of the Oregon Country. As we approached the location we were somewhat disappointed by the very unpretentious structure designated as the museum. However, any disappointment in the outward appearance of the museum was soon forgotten when we began talking with Mr. David F. Haddenham, the proprietor, who showed us his fine collection of marvelous fossil fish and other fossil fauna and flora. It is claimed that this bed has furnished the most perfect speciments of fossil fish that have ever been produced. Among the plant and animal fossils other than fish which have been found in this bed are palm leaves from 6 to 8 feet in length and from 3 to 4 feet wide, an alligator 13 feet long, found in 1890, and which was taken out in 13 pieces; and a bird about the size of a domestic chicken and resembling the snipe or plover in general conformation.

The stratum in which the fossils are found is from 10 to 14 inches thick, located under a 35 foot layer of calcite and slate. The elevation is 6927 feet. Dr. S. H. Knight of Wyoming University has been quoted as follows:

> "The fish lived in a large lake known to geologists as Lake Gosiute which occupied virtually the entire southwestern part of Wyoming during the Green River epoch of Eocene time. Eocene time began approximately sixty million years ago and closed approximately thirty-five million years ago. It is safe to conclude that these fish lived from forty to fifty million years ago. The fish were embedded in fine grained sediment such as mud or silt."

This remarkable record of the life of a former age is well worth a visit by any members of the Society who happen to be traveling in that section of the country.

VOLCANOES AND SPINACH

J. C. Stevens

It appears that a new science has been developed within recent years wherein old mother earth is going to lose caste and become a nonentity merely something to be trodden underfoot. It all came about when the California Agricultural College discovered that mother nature is really in the handicap class when it comes to raising corn, wheat, cabbage, lettuce, spinach rutabagas and such. Everyone knows, of course, that fish are propagated through a sort of left handed Caesarian operation.

Chemical Farming, that's the thing. You grow everything in water to which is added the proper chemical compounds in just the right proportions to induce a maximum of growth and production.

Claims are made I wouldn't be so rude as to say they are exaggerated, but at least they sound like whoppers to the uninformed - that productions such as the following are bandied about glibly - just like that:

Potatoes, 5000 bushels per acre, or was it 50000?

Spinach, a thousand or a million tons per acre, whichever is the most.

Lettuce, unbelievable amounts - I never was good at astronomical figures.

Onions - aw gee, I'm afraid to say it - but who wants 'em anyway?

If this keeps up everybody will move into town, build a balanced aquarium in their backyard and live in luxury at nothing per the rest of their lives. Everything they earn can go to automobiles, theatres, sports, whiskey, and world travel - no grocery bills, no marketing - just pluck 'em and grin.

There is only one fly in the ointment. It seems that some sort of inert matrix is essential in which the plant roots can wander about ad lib. Baskets of moss in a pond have been tried, and it is rumored that a basket as big as the top of your office desk is as good as a 40 acre farm.

But lo! here comes a Moses out of the wilderness who says volcanic cinders beat moss as much as moss beats nothing, furthermore, the best cinders known to the elect are those from a particular volcanic vent long extinct - that lies unconformably on the green grass of Mt. Tabor City Park in Portland, Oregon.

Just wherein lies the special virtue of these particular cinders can only be conjectured but I advance the theory that mingled with them are the tears and sighs of this Society induced by the grief and travail of trying to preserve intact and inviolate this volcano in all its pristine virtue for the curious public and posterity. Omar said it far better than I:

"I sometimes think that never blows
so red
The rose as where some buried Caesar
bled."

Our volcano is not as large as Popocatepetl nor as jittery as Vesuvius, but it's the only volcano we have and we're just not going to see its insides used as stimuli for broccoli So when the Amalgamated Associations of Earthless Agriculture petitioned the city fathers to be permitted to move in with their trucks and haul off those precious cinders, the noise of it leaked out and protests began to arrive Commissioner Bennett saw what was in the offing and asked for a week's truce to get himself orientated

Well, next week finally arrived with both armies encamped in the council chamber. The chemical warfare troops laid down the first barrage, using their most effective syllogisms and statistics. Mayor Carson allowed that regardless of their value for rhubarb they were an integral part of a public park dedicated to public use and he doubted the legal right of the city to dispose of them. Then the Geological Society and the Mt. Tabor Improvement Association brought up their big guns and the battle was won.

Israel Park, Earnest Exponent of the Oregon Chemical Tank Farming Association, gentleman that he is, announced that he had seen the Geological Society of the Oregon Country in action before, had great regard for the scientific attainments of that group, deferred to their judgment in such matters and most graciously withdrew the application amid the applause of both the armies, whereupon he was tendered an application blank for membership in the Society which he agreed to fill out at once.

* * * * * * * *

AN AVALANCHE OF ARTISTRY.

That meticulously minded mentor in matters photographic, Frank I. Jones, delighted an audience in the Mazama club rooms on September 21st with a lecture entitled "Adventure in Color Photography". It was illustrated - of course - with more than two hundred of Frank's inimitable slides, all exquisite in detail, beautiful in composition and immaculately artistic, which qualities are basic in the make-up of the man, as well as of his pictures.

Every detail was carefully prepared beforehand; without a hitch slide followed slide on his spotless screen, projected by intense illumination thru his air-cooled stereptican Accompanying this avalanche of artistry was a running verbal comment, which was as replete with sparkling witticisms as it was with educational value.

The occasion proved to be a veritable conducted tour under an expert and genial guide, first, thru the Valley of Ten thousand Smokes, then thru some of the grandeurs of the Oregon Country and concluding with a visit to the realm of flowers, all protrayed in their true colors. It was truly an exhibition of photography at its ultimate!

C.P.R.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 20 Portland Oregon Oct, 25 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscription $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * *

Lectures

Friday Oct. 28	:	Mr. and Mrs. Chet Wheeler, "An Amateur Geologist's Vacation."
Friday Nov. 4	:	Note the change in date. The second Friday in November is Armistice Day and the fourth Friday immediately following is Thanksgiving. It is considered advisable, therefore, to have only one meeting during November, and that will be on the first Friday of the month The occasion will be a joint meeting with the Agate & Mineral Society The place will be the same, Public Service Auditorium, 8:15 P.M. Dr.Edwin T.Hodge will give us a talk about Mt. Multnomah.

Field Trips

Sunday Oct. 30	:	Leader, Dr Clark of Willamette University, to fossil beds in the vicinity of Salem, and a study of a recent lake bed.

* * *

New Members - Reduction in Dues

Following our usual custom, a two-dollar membership fee will be accepted for the balance of the fiscal year, - from October 1st to February 28th. This reduction applies to NEW members only, and includes a subscription to the News-Letter from v. 4, no 19, to v. 5, no. 4 inclusive.

Civic Booklets

Franklin Davis presented the luncheon group with copies of the Civic report of the City Commissioners, at the luncheon on Oct. 13th. These booklets set forth pertinent facts about City government and are valuable to anyone interested in his government. Thanks, Franklin, not only for the valuable booklet, but for your kindness in thinking of us.

Nominating Committee

The following nominating committee has been approved by the Executive Board and appointed:

Dr. Courtland Booth (Chairman)
Mr. Franklin Davis
Miss Rose Jennings
Mrs. Dwight Henderson
Mr. Leo Simon

Dr. Robert Nelson

Dr. Robert Nelson, who is in charge of exploration for the Netherlands Pacific Petroleum Company (a subsidiary of Standard Oil of California) in the East Indies, talked to a group of the Oregon Agate & Mineral Society and Geological Society of the Oregon Country, Friday night, October 21st. Dr. Nelson is in Portland for a short time and kindly consented to tell us a few things about prospecting for oil in the tropics.

Work is based on airplane photographs. The plane flies at an altitude of 4000 meters, taking pictures so that the centers are one-quarter of a mile apart. These photographs are viewed through a stereoscope and the topographic map built in a manner similar to that used by the 29th Engineers, U. S. Army. The geologists are able to plot dip slopes on the pictures. The maps are then taken into the field and checked on the ground, using available outcrops and when these are non-existent, auger holes are resorted to. As a final check the seismograph method is employed. Charges of dynamite are exploded and seismographs receive the reflected sound. From these data it is possible to determine the angle of dip.

Most of the oil is found in strata no older than middle Miocene. It varies in gravity, some as low as 30°. Most of it has a paraffin base and some of the wax has such a high melting point that the wax finds use for tropical candles.

Dr. Nelson also gave some very interesting side-lights on the life of the natives, and their customs.

Dr. Nelson is a graduate of the University of Oregon, with graduate work at the University of California. Among his acquaintances are Mr. Claire P. Holdredge, and Mr. James Ward, who are engaged in foreign service for oil companies.

* * *

Agate and Mineral Society Convention

The Agate and Mineral Society was host to the Federated Mineral Clubs of the Pacific Northwest during the week-end of Oct. 15-16. An unusually beautiful and instructive exhibit of semi-precious gems and polished specimens was available to the public. Mr. Tom Carney, Mr. A. W. Hancock, and Mr. E. H. Rockwell, of the Geological Society, had excellent displays. Mr. Rockwell presided at the banquet, Saturday evening, as president of the Agate and Mineral Society. Pathe News took motion pictures of the convention.

AMATEUR GEOLOGIST AT COOS BAY

A. D. Vance.

Der Fuehrer Treasher has requested, warned and threatened until I have agreed to record what to me were the highlights of my vacation on Coos Bay.

It had seemed rather futile for me to attempt to go into the geology of an area which has been so well covered by various well-known authors. Diller, 1896 1899 and 1901, Dall, 1898; Henry V. Howe, 1922; Schenck, 1927; F. E. Turner, 1938, and others have collected specimens and discussed the formations.

I have nothing to add to what has been written, but you may be interested in my impressions of the best fossil localities and the places where the stratigraphic features can be seen to the best advantage. If you are interested, my advice is for you to take a copy of F. E. Turner's paper on the "Stratigraphy and Mollusca of the Eocene Western Oregon" and go down for a week.

I was especially fortunate during my vacation in that Dr. Packard was directing the summer field camp of the Institute of Marine Biology while I was there and twice a week he conducted a class in paleontology. He was also collecting specimens of the fossil fauna of the region for the state college.

The Institute of Marine Biology is a most valuable addition to the state's system of Higher Education and Mr. Louis E. Oberson who was enrolled and specialized in the study of Marine Algae will write for you about the school and its work.

If you go down to Coos Bay with but limited time at your disposal my suggestion is that you start at Cape Arago and work north and east along the coast.

Cape Arago is at the base of the Coaledo formation which was named by Diller after the type locality near the town of that name. It is the coal bearing portion of the Arago beds and is upper Eocene in age.

F. E. Turner describes the Coaledo formation as made up of a series of shales and sandstones at least 6000 feet thick, measured from the west end of Bassendorf Beach to the islands off Sunset Bay. But I told you to begin at Cape Arago, and I shall try and be consistent. You should go down the trail from Cape Arago State Park to South Cove first. Here you will see the formation folded into an anticline which passes across the cape plunging northward and disappearing beneath the seaweed-covered reefs in North Cove east of the point where the North Cove trail reaches the beach.

Reefs off the shore between Middle Cove and North Cove indicate the existence of a synclinalfold with its axis in the trough between the reefs and the shore.

Turner divides the Coaledo into three sections, the lower 1600 feet thick, the middle 3200 feet thick and the upper 1200 feet thick and he reports that only the lower and upper sections are highly fossiliferous.

I found the best place for collecting fossils from the lower Coaledo was at Middle Cove. A trail plainly marked "Middle Cove" directs you down the cliff from the Cape Arago StatePark.

Large boulders strewn along the beach are so filled with fossils that one must take a second look to see the cementing agent.

Just off shore at high tide, but connected to the beach at high tide, is a small island. On the shore side of this island one can find excellent specimens of the Eocene sand dollar (Scutella coosensic Kew). Concretions between the island and the shore often contain fossil crabs.

Dr. Packard was quite delighted with the fine specimens of Gastropods and Pelecypods we found and with the number of species. Several species not described by Turner were collected.

On the beach at North Cove the fossils are not plentiful. I managed to find two fossil teeth of a shark and an unidentified fish bone about 1000 feet north of the North Cove trail.

From Cape Arago northward past Sunset Bay to the Cape Arago lighthouse the strike roughly parallels the coast. At the lighthouse the shore line turns eastward into Coos Bay. As a result the section from the Cape to the lighthouse is all in the lower section of the Coaledo. From the lighthouse eastward the sea cliff cuts across the section.

Sunset Bay is about two miles north of Cape Arago and perhaps 1000 feet south of the lighthouse. It is a good fossil locality and should be visited. Along the north shore of the bay we noticed several small fault offsets and looking south across the bay the strike of the steeply dipping formation follows a wide curve indicating that the apparently simple structure may have its complications.

From the lower Coaledo Turner describes 44 species of Molusca and states that 29 of them are common to the Cowlitz formation of Washington or to the Tejon of California.

The upper Coaledo specimens are found in highly fossiliferous lenses in the vicinity of Yokam point.

East of Yokam point the contact formation and the Bassendorf shales are buried by beach, sand and soil. These shales were determined by Dall to be of Oligocene age. As measured by Diller they are about 2210 feet thick. The dip and strike are said to be the same as the underlying Coaledo.

Overlying the shales is the Tunnel Point sandstone reported by Diller as 850 feet thick. In a narrow lens at Tunnel Point, excellent specimens of Acila shumardi were found placing this formation in the same biozone as Pittsburg bluffs. (Nuculid Bivalves of the Genus Acila. Schenck).

Since the south jetty has been constructed sands have drifted in and nearly filled the sea cut tunnel which gave the point its name. Entrance can still be had for a short distance at each end of the tunnel. All three of the sections so far referred to have approximately the same dip and are conformable to each other.

East of Tunnel Point a short distance the western limb of the South Slough syncline (Empire formation) lies unconformably upon the Tunnel Point sandstones. The dip is given by Howe as 40^{o} compared to a dip of 70^{o} for the older formation.

At the point where the south jetty leaves the sea cliff Dr. Packard and I found fossil bones of a large marine mammmal. They are in a good state of preservation. Dr. Packard has them and if any society members find more they should be submitted to the doctor for study.

The Empire formation is marked by fragments of fossil Pectens. In the sandrock at the east end of the jetty railroad tunnel through Coos Head point some good Pecten specimens can be secured. South slough lies along the axis of the south slough syncline (Empire). The eastern limb of the syncline south of Fossil Point is non fossiliferous or nearly so.

Fossil Point is formed by the Coos Conglomerate (named by Dall).

Howe agrees with Arnold and Hannibal that it is a basal conglomerate made up largely of pebbles and fossiliferous boulders from the beds below and lying upon an irregularly eroded surface but does not agree that there is any angular unconformity with the underlying Empire. He believes that the Conglomerates are an integral part of the Empire. He presents convincing data in support of his theory.

For some unknown reason on our first visit to the Coos Conglomerate we found no fossil whale bones. Dr. Packard lectured his class on training the power of observation and we collected fossil shells for an hour.

At a later visit we found at least a dozen specimens of fossil whale in the Coos Conglomerate. Since the surface of the Coos Conglomerate is less than 50 feet square, one wonders where they were when Dr. Packard was advising his class to train the power of observation. Finally, in the Empire formation not fifty feet north of Fossil Point we found a large fossil whale skull half buried in the sandstone and beside it a lower mandible fourteen feet long.

KLICKITAT MINERAL SPRINGS AND GAS ICE PLANT

by J. C. Stevens

On September 25, 1938, the Geological Society of the Oregon Country was entertained by The Gas Ice Corporation at its Gas Ice Plaht on Klickitat River 2 miles above Klickitat, Washington, and about 14 miles above the mouth of Klickitat river. About 18 cars and 70 persons formed the caravan which left Portland at 8:30 am. The route was on the Washington side over the Evergreen Highway to Lyle, then over a fair country road to Klickitat Mineral Springs.

Stops were made en route at Cape Horn, North Bonneville and SP&S tunnel no. 5 between Cooks and Underwood. At Cape Horn a brief talk on the basic geology of the Columbia river was given. In evidence were the old Columbia River Basalts of middle or late Miocene forming the base of the series at this point. On the eroded surface of these basaltic flows, styled by Hodge the Coriba surface, were laid down great deposits of gravels interspersed with silts and reworked volcanic ejecta, called by Betz and Williams the Satsop formation but now more generally known as the Troutdale gravels. On top of these were then laid down a series of lava flows called the Cascade Andesites (Cascan formation - Hodge).

From North Bonneville can be seen splendid exposures of the Eagle Creek formation, resulting from the explosive type of volcanic activity of late Oligocene or early Miocene that underlies the Columbia River basalts were in evidence in Table Mountain and Red Bluffs. From these mountains great landslides occurred that dammed Columbia river, estimated by some at 5000 years ago, whose remains were evidenced by Cascade Rapids at Cascade Locks, now submerged by Bonneville Dam. The Eagle Creek formation is an indurated agglomerate of volcanic pyroclastics, probably ejected from a once mighty volcano. On this formation Bonneville Dam is founded, while an intrusion of andesite on the Oregon side forms the foundation for the power house.

Tunnel no. 5 was of interest because of a collapse of the roof that occurred in the early morning of January 10, 1936, filling the tunnel with gravel for a length of 116 feet. Trains were re-routed for several months over the Union Pacific system. A highway tunnel parallelling the railroad tunnel was then under construction. The portal cut had just been completed when, following a few days of heavy rain, a slide occurred which crushed the concrete roof of the railroad tunnel.

After the debris from the slide had been cleared from the roof of the tunnel it was found that the line of the tunnel was crossed at nearly right angles by an old V-shaped ravine eroded in the solid rock that had been filled with gravels. The bottom of the ravine was about on a level with the grade of the tunnel and the sides sloped about 1 on 2 to a width of 63 feet at the tunnel roof. The tunnel had been excavated in solid rock except for this ravine crossing which of course was through the gravels. It was this 63-foot length of roof that broke under the weight of the overburden. The tunnel was constructed in 1906 and had stood all these years until the portal cut of the highway tunnel had been completed. A suit against the State of Washington Highway Commission, just concluded in the Superior Court at Olympia, was won by the SP&S Ry. Co. and damages of some $130,000 awarded the railroad company. The case is now on appeal to the Washington State Supreme Court.

Klickitat Mineral Springs were reached at 1:00 pm where the Gas-Ice Corporation had hot coffee and cream ready for the crowd. Lunch was eaten in the bottling plant. Ice cold Klickitat mineral water was also served and sample bottles given to all and sundry. After lunch talks by Mr. Roy Ellison, Vice-president of the company, Mr. Jack Newbern, Superintendent of the plant, and the writer gave the background of the development; the essentials of which are set forth following:

Historical. The presence of carbon dioxide gas with spring water at Klickitat Mineral Springs, Washington, has been known to exist for a great many years. The Indians at Klickitat, who originally owned the land on which the springs are located, used the water and oxidized clays for medicinal purposes long before the presence of the white man in the Northwest, and they named the springs "Klickitat", meaning "pure water". It remained, however, for one, John W. Langdon of Walla Walla, Washington, to see the possibilities of utilizing the mineral water by bottling it at the location and placing it upon the market. He built some very fine buildings, a hydro-electric plant, using the water from the Klickitat river, and had his project nearly completed in the fall of 1930 when he died. The properties were held for some time by the Langdon estate in the name of the Klickitat Mineral Springs, Inc. In 1931 it was decided to dispose of the properties and Ray B. Newbern of Seattle acquired them by purchase under a ninety-nine year lease.

In 1931 the Gas-Ice Corporation was organized to take over and operate the property and to build a plant for the manufacture of solid carbon dioxide, known as Gas-Ice, Dry-ice, Nu-ice, and various other trade names.

Efforts were immediately concentrated on the manufacture of solid-carbon dioxide and the marketing of the mineral water was temporarily deferred. The Gas-Ice plant was completed and the marketing of ice began in May 1932. The production of the present plant averages about four tons per day. The use of solid CO_2 as a refrigerant is comparatively new. It was first sold commercially for this purpose about 1925. Table 1 shows the growth of the Solid CO_2 business in the United States as well as the production by the Gas-Ice Corporation at Klickitat.

Table 1
SOLID CARBON DIOXIDE PRODUCTION

Year	Production in USA	Production at Klickitat, Wash., by Gas-Ice Corp.
1925	170 tons	
1926	525	
1927	1715	
1928	7000	
1929	22000	
1930	50000	
1931	70000	
1932	78000	98 tons
1933	88000	207
1934	91000	315
1935	95000	466
1936	130000	543
1937	220000	606
1938	300000	800

The Production of Solid Carbon Dioxide. The CO_2 gas comes with mineral water from drilled artesian wells. At the surface the water and gas are separated, the water flowing to the river and the gas being drawn to the plant by a suction pump operating at about 4 inches (mercury) of vacuum (12.6 lbs. per sq.in. absolute), where it is stored in a gasometer. The process of solidification consists of compressing the gas in two stages to about 500 lbs. per sq.inch and cooling it by refrigeration to about 40° below zero where it liquefies and is pumped into steel storage tanks.

When this low temperature gas is released in the snow press through a small nozzle into atmospheric pressures within the snow press, the expansion cools it down to about 110 degrees below zero where it solidifies in the form of snow and is then compressed in the press to solid white cakes 10x10x15 inches, weighing 80 lbs Solid CO_2 weighs 92 pounds per cu.ft , nearly 70% more than water ice, and has a temperature of 109° F. below zero. Each cake is wrapped in paper and then enclosed in a paper carton and stored in insulated bins until shipped. About 10% loss is allowed from the plant to destination.

The remarkable thing about the Klickitat gas is its purity. Table 2 gives the results of analysis of the gas.

Table 2
ANALYSIS OF KLICKITAT CO_2 GAS

Carbon Dioxide	98 4%
Oxygen	0 3
Nitrogen	1.3

The presence of oxygen and nitrogen was probably due to an admixture of air in the sample. The absence of even a trace of sulphur is very gratifying. There are a number of wells in the country producing CO_2 gas but it generally contains sulphur gases or other ingredients that render it unfit for refrigeration purposes without expensive purification.

Otherwise the production of CO_2 gas for the manufacture of dry ice is by burning coal or petroleum or by freeing the gas from the resulting impurities. The principal producers are the Air Reduction Corporation and Liquid Carbonic Corporation.

Mineral Water. A modern bottling plant has been installed where the mineral water is bottled and sold as a beverage and a mixer. A contract has recently been consummated with Safeway Stores under which it is marketed under the name of "Merry Mix". The water is obtained from the flowing well in the bottling plant. It is first settled and treated to eliminate the free iron that would otherwise stain the bottles, then filtered and recharged with CO_2 gas and bottled for shipment. Table 3 gives the chemical analysis of the mineral water.

Table 3

ANALYSIS

Ions & Radicles		Mgms. per Litre	Equivalts.	Parts per million
Silica	(Si0.2) Ion	99.4	1.0600	99.0
Silica	(Si0.3) Radicle	40.4		40.2
Sulphuric Anhydride	(SO.4)	None		None
Bicarbonic Acid	(HCO.5)	1293.0	21.1974	1288.0
Nitric Acid	(NO.3)	.4	.0064	.4
Nitrous Acid	(NO.2) Trace	Less than .1 -		Trace less than .1
Phosphoric Acid	(PO.4)	.7	.0221	.7
Metaboric Acid	(Bo.2)	None		None
Arsenic Acid	(AsO)	None		None
Chlorine	(Cl)	7.5	.2115	7.5
			22.4974	
Bromine	(Br)	None		None
Iodine	(I)	None		None
Iron	(Fe)	11.7	.4190	11.6
Alumnia	(Al.20.3)			2.7
Manganese	(Mn)	None		None
Calcium	(Ca)	155.2	7.7466	154.6
Barium	(Ba)	None		None
Strontium	(Sr)	None		None
Magnesium	(Mg)	153.6	12.6320	153.0
Potassium	(K)	10.7	.2737	10.7
Sodium	(Na)	32.8	1.4261	32.7
Lithium	(Li) Trace	less than .1-		Trace less than .1
Ammonium	(NH.4)	" " .1		" " .1
Volatile & Organic		188.0		187.2
		1996.1	22.4974	1988.3
Free Ammonia		.2		.2
Alb		.3		.3
Nitrogen in Nitrates		.1		.1
Nitrogen in Nitrates		Trace		Trace
Oxygen required		.36		.36
Free Carbon Dioxide		1342.00		1336.6

HYPOTHETICAL COMBINATIONS

	Mgms. per Litre	Parts per Million	
NaNO 3	.5	.5	Sodium Nitrate
K CL	15.8	15.7	Potassium Chloride
KHCO.3	6.1	6.1	Potassium Bicarbonate
HaHCO.3	119.4	118.9	Sodium Bicarbonate
Mg (HCO.3)2	923.9	920 4	Magnesium "
CA (HCO.3)2	540 3	538.1	Calcium "
FE (HCO.3)2	37.3	37.2	Iron "
Ca.3 (PO.4)2	1.1	1.1	Calcium Phosphate
Ca SiO.3	61.6	61.4	Calcium Silicate
Al 20.3	2.7	2 7	Alumina
SiO.2	99.4	99.0	Silica
Volatile & Organic	188.0	187.2	
	1996.1	1988.3	

ORIGIN OF MINERALIZED WATER AND CARBON DIOXIDE GAS

The following is extracted from "Report on Properties at Klickitat Mineral Springs", by Claire P. Holdredge, Consulting Geologist, made for Gas-Ice Corporation, Seattle, Washington:

"Carbon dioxide gas occurs in many places in the world in close association with volcanic activity and there are few natural occurrences of it that are not definitely traceable to that source. It is given off when the pressure is relieved on a molten magma and the mass becomes stationary and starts to cool. Water is given off in a like manner and when charged with carbon dioxide is a strong solvent and may carry large quantities of mineral salts in solution. When waters given off in this manner find their way to the surface through the natural openings in the rocks they form mineral springs. If their source is close to the surface and the cooling mass from which they come still hot the springs may produce hot water. When the source is farther down and the water forced through cool rocks then the springs are cold. In some cases the gas may escape alone and on its way to the surface encounter descending waters. Under the pressures existing at depth the waters may become charged with the gas making them strong solvents for the minerals in the surrounding rocks. Thus the charged waters returning to the surface may dissolve much mineral matter from the rocks with which they come in contact.

"The springs in the Klickitat area producing mineralized water and carbon dioxide are undoubtedly of volcanic origin. The nearest volcanic vent known to exist in the area is Kelley Butte, near which is Blockhouse Spring, about 7 or 8 miles west of Goldendale and about 8 miles east and 2 miles north of the Gas-Ice Corporation plant. This vent was formed long after the basalts of the Columbia River Formation had been formed, folded and eroded and it is probable that the mineral springs were formed at this time. But the springs in the Klickitat Canyon, since most of them issue from the northwest wall of the canyon, do not come from the intrusive body which formed Kelley Butte Somewhere deep down below the bottom of the canyon and perhaps slightly to the northwest a body of similar lava failed to reach the surface for some reason. The gas and probably the water are now coming from such a body of lava as it slowly cools and crystallizes.

"The depth at which this lava is cooling and giving off the gas is unknown but it is probably great because the waters are apparently about the same temperature as the rocks from which they issue at the surface of the ground. The amount of basaltic lava below the bottom of the Klickitat Canyon is probably more than 1000 feet and since these basalts are highly resistant to intrusions of lava it is likely that the intrusive body from which the water and gas is coming does not extend up into the basalts and may not extend even up to the bottom of them.

"The water and gas rise to the surface through the natural openings in the basaltic lavas of the Columbia River formation. These include the various types of fractures and the bedding planes described earlier in this report. It is certain that they do not follow a very erratic course. They no doubt ascend along many different fractures at the same time and may follow a zig zag course by travelling laterally along horizontal openings where the course offers the least resistance. This is true only of the basalts. Since it is not known what formations underlie the basalts nothing can be said of the manner in which they may arise through these formations if their source is deeper than the base of the basalts. The wells that have been drilled close to former springs of the charged mineral water indicate a more or less vertical course, at least from the depth to which these wells have been drilled. In practically every case the wells nearest the original springs have been the heaviest producers of gas while wells at some distance from the springs have shown a more or less proportional decrease.

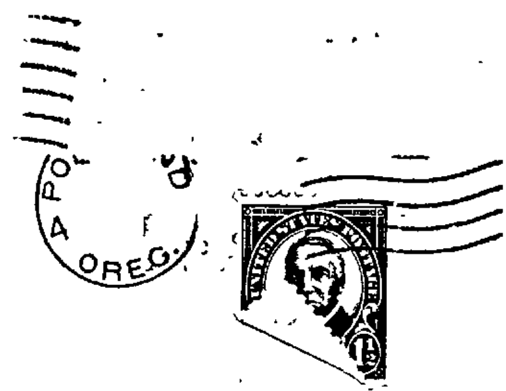
"Development of these springs, begun about 1930, has resulted in the digging of two wells and the drilling of twelve others. These are in two groups, one of which is near the bottling plant while the other is about 3000 feet east near the north bank of the river. Two wells in the former group and one in the latter are now producing practically all the gas. In general these are the deeper wells and the wells closer to the original springs. All the wells in each group capable of producing appear to be interconnected but the two groups do not appear to be connected to the extent that the pumping of one group affects the other group.

"There is no possibility of depleting the supply of carbon dioxide in this area. It will continue to be given off by the cooling lava mass from which it comes for thousands of years in approximately the same volume that it is given off today. The cooling of the lava is the controlling factor and this cooling is so slow at the depth at which it is occurring that it is imperceptible. Therefore the question of depletion need be given no further consideration".

* * *

Our fellow member, E. N. Bates, chairman of Oregon Section of American Society of Mechanical Engineers, is now in Los Angeles, attending the Annual Regional Conference of the Pacific Coast District of that society.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed



Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 21 | Portland Oregon | Nov. 10 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscription $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * * * * *

Field Trips

Sunday Nov. 13 : The Mazamas have invited the Geological Society of the Oregon Country to accompany them on a tour of the State Capitol. The party will leave Portland at 9 A.M., and reassemble in Salem at 11 at the Capitol building. A dinner is being arranged at the Argo Hotel for those who wish to eat with the Mazamas. Full particulars may be obtained from any Mazama.

Sunday Nov. 20 : Leader, Franklin Davis. Larch Mountain. Party will leave the usual meeting place, 6th & Yamhill, at 8 A.M.; drive to within $1\frac{1}{2}$ miles of the top of Larch Mountain. Those who wish to remain at the forest camp may do so. Hike to the top of Larch Mtn. Mr. Davis has scouted many interesting outcrops and this should be an unusually fine field trip. Mr. Davis also suggested that each member bring plenty of lunch!

Lectures

Friday Dec. 9 : Mr. Thomas A. Carney. "A Geological Fantasy, by an Amateur Photographer", the geological wonders of the National Parks, in moving pictures. Mr. Carney takes exceptionally fine pictures and a large part of his exhibition consists of color film. Mr. and Mrs. Carney toured a number of the National Parks this summer, and this account of their vacationings should be particularly pleasant. Be sure to save this date.

NOTE : There will be no lecture on Nov. 11, Armistice Day, nor on Nov. 25th, which immediately follows Thanksgiving; nor on Dec. 23 which is just prior to Christmas Eve. It is not the policy of the Geological Society to pass any lecture date, but it is considered that this arrangement is most advisable, under the conditions.

NEW MEMBERS

The Geological Society of the Oregon Country is proud to announce the following new members. Thus our Society grows and the fascinating hobby of geology is extended to more and more people.

Miss Nellie Lange
1534 S.W.56th Ave.
Portland, Oregon Phone TA 8164

Mrs. Julia S. O'Brien
Martha Washington Hotel
Portland, Oregon Phone AT 8047

Dr. and Mrs. Adolph Weinzirl
3536 NE 27th Ave.
Portland, Oregon Phone GA 5706

COMMITTEE APPOINTMENTS

Annual Banquet Committee:
Dr. and Mrs. Arthur C. Jones, co-chairmen
(Committee membership will be announced in next issue of the News-Letter)

Projection Screen Committee
Mr. O. E. Stanley, Chairman
(Committee to be announced)

OREGON CERAMIC STUDIO OPEN HOUSE

The Oregon Ceramic Studio has arranged to keep an Open House on November 19 and 20, (Saturday and Sunday) from 10 to 5 o'clock. A special invitation is extended to the members of the Geological Society of the Oregon Country to see the building on Saturday or Sunday. The address is 3934 SW Corbett St. It can be reached directly by the N & S Portland bus (Third Ave.) which passes by the door. By auto, it is one block toward the river, at Thomas St., from Barbur Boulevard; also, from Ross Island Bridge by going around the Island and over the bridge one goes south a few blocks. Corbett St. is the street defining the west side of the Island. The invitation is extended through the courtesy of Mrs. Lydia Herrick Hodge.

NEWS OF THE MEMBERS

Mr. Thomas A. Carney showed some of his fine motion pictures of Yellowstone National Park at a meeting of the Portland Soroptimist Club on Oct. 24th.

Mr. Ray Treasher made an appearance before the Mazamas on Oct. 26th, using the Wallowa summer camp of the State Department of Geology and Mineral Industries as a basis for his talk.

Dr. Edwin T. Hodge addressed the combined Agate & Mineral Society and the Geological Society of the Oregon Country on Nov. 4th, lecturing on Mt. Multnomah. Over 240 members and guests were present. Have you noticed that without exception our largest meetings occur when Dr. Hodge makes the address?

ERRATA

The following item should have appeared just under the title of Dr. Smith's article, "Highlights of a Geological Travelogue through Oregon":

"The following manuscript was published, in part, by the Oregon State Highway Department. It is thought that the complete manuscript will be of interest to members of this society, and permission for its use has been granted by Dr. Smith and by the State Highway Department."

THE ROCKCRUSHER

The Oregon Agate & Mineral Society announces their new society bulletin entitled "The Rockcrusher". It gives news notes and items of interest. It is rumored that Mr. A. W. (John Day) Hancock has something to do with its publication.

FOSSIL HUMAN FOOTPRINTS

by R. R. Poppleton

A couple of years ago on the trip to Mt. Adams, the caravan stopped at Little Goose Lake, about seven miles west of Peterson Guard Station, and inspected so-called footprints in the rock which were visible at low water stages. This brought to the minds of several of us the footprints which we all supposed were in the lava on the slopes of Kilauea crater on the island of Hawaii. Since that time, I have carried on a correspondence with various parties, both at Washington and at Hilo, and I have just recently secured an article from Mr. B. F. Moomaw, Jr., Acting Superintendent of the Hawaii National Park, entitled "Fossil Human Footprints in the Kau Desert" by T. A. Jaggar, Volcanologist, located at Hawaii. This article is very complete and I quote extracts from the same as follows:

"In the spring of 1920 during visits to Mauna Iki (the long dome of lava built in 1919-20), Mr. R.H. Finch discovered the prints of naked human feet in old beds of volcanic ash. In current exploration of the desert these ancient trails have been photographed and knowledge of them is increasing. The prints are preserved by solidification of the ash mud though the agency of a carbonate or sulphate crust. This is the pisolitic ash which increases in thickness nearer to Kilauea. The pisolite spheres give evidence of mud rains, and the footprints have invariably been found in the layers showing the solidified rain drops. The squashing out of the mud from under the bare feet is shown in the hardened impressions. Scores of these impressions of adults and children are preserved in a tract of low ground, protected from erosion, a few hundred yards west of the Mauna Iki, and about six miles from Kilauea southwest. A few footprints of pigs have been found, lithified and ancient like the human tracks. Elsewhere the ash beds have been mostly washed away by winter storms. The beds are remnant from a mantle of irregular thickness which in 1790 covered the whole country for a depth of from four to thirty or more feet. There is one lower layer which shows sun-dried mud cracks, and this stratum has a few footprints. The main layer exhibiting footprints is the upper stratum about three feet above the mud crack layer. Between the remnant patches of ash which preserve the hardened footprints there are flat and sloping areas of washed old pahoe-hoe lava. The ash patches in this region are not very numerous, and many of them preserve footprints, showing that great numbers of natives crossed the country when it was covered with volcanic mud.

"This fact agrees with Hawaiian history to the effect that the "army" of Keoua, a native chief, crossed the desert from Hilo to Kau during the explosive eruption of 1790, when one company of these warriors was overwhelmed and killed. The footprints are directed both towards Kilauea and away from it, and the petrified trail has now been followed for about four miles, with groups of footprints discovered here and there along a route which extends northeast-southwest between localities five miles and nine miles southwest of Kilauea crater. The investigation is not yet completed "and it is still doubtful whether the main trail passes Kilauea on the north or the south side. The lapilli and coarser beds near the crater are not suitable for preserving any impressions. Stone shelters used by the native wayfarers were overflowed by the lava of 1920 on the east side of Mauna Iki. Footprints have been found about a mile northeast of Mauna Iki along what seems to be two different routes. There is no possibility of these footprints being modern, for the natives of this high country rarely go barefoot, this ash does not make mud patches today, and the solidified shell in which the footprints are lithified was a product of the acid volcanic gases, mingled with mud rains, which were distinctive of the 1790 eruption. Furthermore the extensive erosion of the ash, now represented by remnant patches bearing footprints, the footprint layers being clearly older than the erosion, effectually disposes of any theory attributing recent origin to the prints. Lastly, the fact that the mud-crack layer exhibits some footprints, positively dates the trails as contemporaneous with the eruption, for this layer was buried under subsequent ash strata of the same eruptive period."

At this point the article goes into the detail of the eruption which, as you will note above, was dated in 1790, and also gives details of the various parties who were caught in the eruption and photographs of skeletons found. The assumption is that the explosive column during this eruption shot up at least 30,000 feet above the summit of the mountain and from various legends we gather that various people lost their lives at three distinct localities.

The interesting conclusion which I arrived at was that we were all mistaken when we stated that the footprints were in lava which had solidified after the prints were made.

I also have a letter from Margaret Titcomb, Librarian of the Bernice P. Bishop Museum at Honolulu, definitely stating that the fossil footprints are in volcanic ash, not in molten lava. I copy as follows:

"The fossil footprints, which are in volcanic ash, by the way, not in molten lava, have been written up by Dr. T. A. Jaggar, in the Hawaiian Volcano Observatory Bulletin, Volume 9,1921, pp. 114-118, 156-157. You may wish to read also 'The Products and Structure of Kilauea', by John B. Stone: Bulletin 33, B. P. Bishop Museum, though nothing new is given concerning footprints alone. In Dr. Jaggar's article reference is made to other works, but I believe that Dr. Jaggar's article is more comprehensive than any other".

I have also a letter from Harold S. Palmer, Professor of the University of Hawaii at Honolulu, from which I quote as follows:

"I know of no footprints made in <u>molten lava</u>!

For information regarding the footprints made in <u>wet, cool volcanic ash</u>, near Mauna Iki on the southwest slope of Kilauea, I would recommend that you address the Superintendent of Hawaii National Park, Hawaii, T.H."

I have the complete information assembled at my office and will be glad to have anyone drop in and look the same over at their convenience.

HIGHLIGHTS OF A

GEOLOGICAL TRAVELOGUE THROUGH OREGON

By Warren D. Smith
University of Oregon.

To the person who makes geology his life's work, or to the layman who makes geology his hobby, the State of Oregon offers many unique features and a great diversity of geological formations. A part of that vast region, the Pacific Northwest, formerly known as the Oregon Country, Oregon is a segment of the most active part of the continent, where not only is the world still "in the making" (much of it dating from the Tertiary), but where from Alaska to Mexico, some of the most active geological investigation in the country is now being carried on. A great mountain range, the Cascades, a chain of volcanic peaks extending north and south, divides the state into a one-third marine western portion and a two thirds continental eastern portion, and is directly responsible for striking and far-reaching climatic differences.

Geological formations with their great diversity in composition, structure and age, and important climatic differences cause the state to be subdivided naturally into eight distinct physiographic regions: (1) The Coast Mountains; (2) the Willamette Valley; (3) The Klamath Mountains; (4) The Cascade Range; (5) The Columbia-Deschutes Plateau; (6) The Blue Mountains (and Wallowa Mountains); (7) The Snake River region; (8) The Central Lake region (Great Basin).

Some of the outstanding geologic and scenic features in the 96,000 square miles of this diversified terrain comprised in this great state are briefly described below in following sections. The attention of the more serious traveller or student of natural history is called to the bibliography prepared by Treasher and Hodge for the State Planning Board.

THE OREGON CAVES

In the northern part of that vast area known as the Redwood Empire, hidden away in the Siskiyou Mountains, 52 miles southwest of Grants Pass on U.S. Highway 199, are the famed Oregon Caves. These "marble halls" are great caverns found in a bluish gray marble formation which is an altered series of limestone beds deposited in an ancient sea, probably as far back as the Paleozoic era. Later there was a period of mountain making during which much of the limestone changed into marble. Through the fractures caused by the folding and buckling of the earth's crust, the ground waters seeped, slowly dissolving the softer limestones, leaving the giant chambers and passageways which we see today far below the surface of the ground. These waters, through precipitation and evaporation, deposited a part of their material in fantastic amber-colored pendants (stalactites) and in grotesque accumulations on the floor (stalagmites), which in places have joined to form giant pillars seemingly to support the exquisitely frescoed ceilings.

The largest chamber in the Oregon Caves is known as the "Ghost Chamber" in which a hundred or more people may easily assemble. Perhaps most spectacular is the chamber known as "Paradise Lost" where the majestic stalactites and stalagmites are enhanced by a system of colored lights.

On every hand are balustrades, chandeliers, minarets, and altars, sparkling with myriads of lights reflected in mirror-like subterranean pools. There is the tinkle of softly falling water but there is no sound of birds, no rustling of forest leaves - only the quiet of underground passageways and chambers of a subterranean world.

THE OREGON COAST.

For 400 miles from the California line to historic Astoria, Oregon's splendid coast highway (U.S. 101) follows the blue Pacific, winding its way through aisles of rhododendron (Rhododendron californicum), azalea (Rhododendron occidentale), and golden Scotch broom (Cytisus scoparius); cutting its way into rugged cliffs nearly a thousand feet above the water; spanning rivers and bays with picturesque bridges; paralleling glistening beaches, virtually at the edge of the pounding surf; skirting mountain-like sand dunes and lakes bordered by evergreen virgin forests; passing at every turn geologic features which invite investigation and study. Within this distance the traveller will see three initial types of coast line; namely, those which are the result of volcanic accumulations; those resulting from regional movement, such as submergence and emergence of large portions of the land; and those which are the result of faulting where there have been great ruptures in the terrain, causing displacement of formations.

From the California line as one drives northward along this magnificent highway, he sees first north and south of the small town of Brookings a fine example of an elevated wave-cut coastal plain, dotted with old sea stacks varying from 100 to 150 feet in height. Midway between Brookings and Port Orford is the Devil's Washing Machine, a local name given to an exceptionally large vertical fracture 15 to 20 feet wide extending nearly 100 feet into the hard sandstone. Like a gigantic hydraulic ram, the sea forces itself with tremendous pressure into the cleft, smashing and thundering against the inner walls, shooting high into the air to fall in showers of white spray and foam.

As the traveller speeds northward he passes the westernmost point of the Oregon coast, Cape Blanco, and comes to "Bandon-by-the-Sea". Its gaunt sea stacks, arches and caves line the white beach - lonely and isolated remnants of an ancient wave-cut platform.

Beautiful Coos Bay where the forest-covered hills come down to meet the sea, is a fine example of a coast of submergence where sinking has taken place, resulting in the drowning of the river mouth. One arm of this bay is spanned by a mile-long, concrete bridge, one of the new group of bridges which marks the completion of one of the longest and finest highways in North America. Along this highway, north of Marshfield, one travels past a chain of narrow lakes which are in the main old rivers dammed by migrating sand dunes which are now covered by forests. One of the largest and most beautiful of these is Siltcoos. The evergreen canopied shores of these lakes are unrivalled as sites for summer resorts and homes and their waters provide unexcelled sport for the fisherman and boatman.

Almost within the shadow of that prominent and picturesque headland, Heceta, is a series of remarkable caverns, some hundreds of feet long, produced by marine erosion along the fractures and joints in basalt and basaltic agglomerate. One of these is the well-known Sea Lion Caves which has three openings, two from the sea, and one from above by which the cave is now entered by means of a stairway. Here in the comparative quiet and shelter of these great stone walls, sea lions from the open waters come to rest on rocks near the center of the largest cavern.

Like a giant watchdog, Yaquina Head, just north of Newport, topped by its lighthouse and coast guard lookout, stands high above the bar at the mouth of Yaquina Bay. Similar to most of the headlands along the Oregon coast, it is made up of a large mass of volcanic intrusion which is harder than the surrounding materials and has thus withstood the battering of winds and waves. Interesting fossils, both invertebrate and vertebrates, have been found in the rocks near Newport, beginning many years ago with Dr. Condon's investigations, up to the recent finding by E. L. Packard of the remains of a primitive Miocene whale.

Cape Lookout, although several miles off the highway, is perhaps one of the most scenically interesting spots on the entire Oregon coast. This cape, extending nearly two miles out to sea at right angles to the coast, rises in almost sheer cliffs 600 to 700 feet above the water. Here a great lava stream from the back country poured into the sea, leaving its record at lower levels in the form of "pillow" lava, a structure produced by the sudden chilling of hot lava under water. A short distance back of Cape Lookout and south of Cape Falcon, is Neahkahnie Mountain, rising to an elevation of 1700 feet. Its bold cliffs drop like an escarpment 900 feet and some of its valleys have been cut off by faulting and are literally hanging valleys. Around this mountain, the highway cuts its way almost a thousand feet above the thundering breakers.

And now the traveller comes to the end of this great expanse of rugged timber-lined Oregon coast - to the famous Clatsop Spit and beach ridges just south of the Columbia river. These ridges are entirely made up of sand and gravel thrown up like great waves. They vary in height from 25 to 50 feet and are in some cases 100 feet wide at the base. Investigation indicates that they owe their origin to the building of off-shore bars which grew in height, after the bar reached sea level, by the addition of windblown and waveborne materials, thereafter becoming dune ridges.

THE COLUMBIA RIVER GORGE AND MOUNT HOOD.

The Columbia river, mightiest river of the west, and the picturesque gorge which it has cut through the Cascades on its way to the sea, present a galaxy of natural scenic wonders that have few rivals on the globe. From Portland, U.S. Highway 30 serpentines and tunnels its way mile after mile around and through solid basalt precipices eastward to join that part of the highway known as the Old Oregon Trail. Multnomah Falls drops like a lacy, white band over brown basalt cliffs into an evergreen sylvan setting of ferns, flowers, and trees. It is only one of a dozen or more cascades which line the south side of the gorge - Bridal Veil, Latourell, Sheppards Dell, Cooper, Elowah, and Horsetail. Perhaps even more striking and unusual is Oneonta Gorge - "Place of Peace". This amazing rift in the canyon walls is so narrow in places that one can almost span the cleft with his outstretched arms.

Forty-two miles east of Portland, on a "dike" of hard igneous rock, the Army engineers have completed the great $52,000,000 Bonneville Dam which, when its power plant is fully installed, will generate over 200,000 kilowatts of electricity. Locks have been constructed which will allow ocean-going vessels to navigate the deep lake which will extend over fifty miles inland above the dam

There are many Indian legends centered about the Columbia river and its gorge. Perhaps the most interesting and fanciful is that of the "Bridge of the Gods". A simple version of this legend claims that at one time the river was spanned by a great natural arch, beneath which canoes passed on their way up and down the river. In time, however, Mt. Hood to the south and Mt. St Helens to the north, had a quarrel and threw out smoke and fire and hurled great rocks at each other. The earth trembled for miles around and the great bridge was broken down, falling into the water and forming a dam, which forced the river to leave its course and follow a new one. The real facts about this mythical bridge as learned through a geological examination of the terrain indicate that there was a tremendous landslide or succession of slides on the Washington side of the river. Millions of tons of rock broke away from Mt. Hamilton and Table Mountain. As a result of this slide the Columbia was forced out of its old channel and now follows a new course south of the old one. Stumps of old, yet quite modern trees, for many miles up river point conclusively to the existence of a temporary prehistoric lake formed at the time of this slide.

This great river and its gorge present a complex picture which has become the subject of controversy among geologists. However, a general perspective of the gorge shows that it was formed principally by erosion (possibly predetermined by one or more great fractures or faults) in a tremendous pile of volcanic flows and interbedded accumulations of ash and coarser fragmental material.

Topping and climaxing these flows at the crest of the Cascades, and of comparatively recent volcanic origin stands Mt. Hood, lordly sentinel of the Columbia. Geological studies of this region by E. T. Hodge have indicated that the present young mountain may overlie the stumps of older mountains whose trend was at variance with that of the present Cascades. This glacier-scarred peak, rising to an elevation of 11,225 feet is one of the favorite winter playgrounds of Oregon. In summer its alpine meadows and slopes are luxuriant with blue gentian (Gentiana calycosa), purple lupine (Lupinus Lyallii), red monkey flowers (Mimulus Lewisii), and alpine asters (Aster alpigenus). Along its sparkling, sunny streams, mirrowed in the clear waters one may find elephant heads (Pedicularis groenlandica) and tall blue polemonium (Polemonium caeruleum).

WALLOWA LAKE AND THE WALLOWA MOUNTAINS.

In the extreme northeastern corner of Oregon, overlooking beautiful Wallowa Lake, is the final resting place of old Chief Joseph, noble warrior of the Nez Perces. It is fitting that today hundreds of people pause before the monument erected above his grave before they go on into the wonderland, once his happy hunting ground, now set aside by the government as a great natural playground - the "Switzerland of Oregon". Wallowa Lake (wallowa, after the fish weirs used by the Indians) is a typical glacial lake, formed by the damming of a river gorge by the lateral and terminal moraines of a glacier which was some 17 miles long but has shrunk to less than one fourth of a mile. By horse trail one may climb to Eagle Cap, the central peak of the range and nearly 10,000 feet high, and there see the remnant of this once mighty alpine glacier that ploughed its way down to the back door of the present little town of Joseph, throwing up along its sides the enormous lateral moraines which add so strikingly to the landscape about the lake. Like stupendous railroad embankments constructed seemingly by some prehistoric race of giants, they are indeed remarkable topographic features. To have built these embankments several hundred feet above the level of the water in the lake, the ice-stream must have been nearly 1,000 feet thick. The present lake, sometimes reported to be "bottomless", is 283 feet at its greatest depth yet sounded, but in most places is comparatively shallow.

The Wallowa Mountains as a whole comprise a great mass of granite and marble which was upthrust and with a vast covering of lava, much of which has since been removed by erosion. Today we find some of the highest peaks of the range thus partially capped. The scenery of the higher Wallowas is dominated by those features characteristic of glaciated regions: U-shaped valleys, cirque amphitheatres, roches moutonnees (sheep-backs), aretes or comb ridges, cirque lakes (of which Aneroid Lake is one of the best examples) and moraines. In the lake basin one sees a giant stairstep of miniature, glacial lakes (Horseshoe lake, Moccasin Lake) - crystal clear and cold, generously covered with lily pads and surrounded by meadows of wild flowers. This picturesque country is the home of innumerable conies (rock rabbit) whose shrill bark greets the pack train from every talus slope. Higher, but seldom seen, on the narrow ledges of granite crags dwell mountain sheep. Not so elusive are the elk which roam the alpine meadows and come often, unafraid, to the grassy lowlands at the upper end of Wallowa lake.

THE SNAKE RIVER AND HELL'S CANYON.

One may travel the world over before coming upon a sight so inspiring, so awesome as the "Grand Canyon of the Snake". In this remarkable gorge with 1,000 feet of vertical cliffs along the eastern boundary of Wallowa county, flow upon flow of Miocene lavas, totalling nearly 4,000 feet in thickness, rest upon an old Eocene erosion surface of mountains and valleys long since buried, now being exhumed by the river from the tomb of time. In this enormous V-shaped trench, we can literally see down into the bowels of the earth to some of the oldest rock in the state. From the spire-like range of the Seven Devils on the east to the Wallowa Mountains on the west this gigantic slash in the earth is one of the deepest known gashes on the globe. Viewed from the topmost ledges of the canyon wall the Snake river seems to wind its way like a silver ribbon without movement or sound through Hell's Canyon far below, but only two parties have negotiated its turbulent waters by boat, one of them Oregon's own youthful explorer, Amos Burg.

THE OWYHEE BOX CANYON.

Cutting deep into the lava beds of central Oregon on the extreme eastern border in Malheur county, 30 miles south of Nyssa, the Owyhee river has carved a box-like canyon which is spanned by a concrete dam 405 feet high. When full the reservoir has a capacity of 232,983,000,000 gallons, which is a two years' supply of water for approximately 100,000 acres (30,000 in Oregon) of rich farming land reclaimed from a region formerly covered with sage brush, juniper and greasewood. Here where once only scattered ranches dotted the most fertile spots and the coyote and jack rabbit were the only inhabitants of the drier parts of the shallow valleys, water has worked its magic and now there are hundreds of new farm houses and barns surrounded by acres of sugar beets, alfalfa, wheat and other grains.

THE GLASS BUTTES.

The Glass Buttes are in the northeastern corner of Lake county between Bend and Burns on Oregon State Highway 54. According to the Coast and Geodetic Survey they have an elevation of 6390 feet, although the buttes proper, consisting of two prominent dome-shaped hills surrounded by lesser prominences, do not reach a greater elevation than 1900 above the desert plateau. These buttes, dating from late Tertiary time, are extrusions of volcanic glass (obsidian) which has given rise to the present name. Here may be found "iridescent" obsidian that remarkably beautiful natural glass so greatly prized by mineral collectors. When held to the light it presents a rainbow-like play of colors - the most unusual of which are blue, green, purple, and red.

THE JOHN DAY FOSSIL BEDS.

After leaving the little town of Dayville, speeding westward along the John Day highway (U.S. 28), the traveller passes through Picture Gorge, an exceedingly narrow defile, cut through 23 flows of basalt of Miocene age, a part of the great Columbia lava series. This gorge, with its multi-colored spires, castles and cathedrals of stone, received its name from the picture writing left by Indians on the rocks near the south end. Some of these writings (pictographs) are figures painted in ochre, while others (petroglyphs) are engravings on the rocks.

Leaving the gorge, the traveller comes into the ancient lair of the Oreodonts, a vast amphitheater of almost treeless hills presenting a varied grouping of colors and outlines - great splashes of green interspersed among brown, buff, mauve and red ochre, with the distant, forest-covered Blue Mountains a towering background. This is the tomb of hundreds of prehistoric animals, the famous John Day fossil beds, first made known to the world by the late Dr. Thomas Condon, Oregon's pioneer geologist. Here are some of the earliest historic records of future Oregon - Oregon's Oligocene. Millions of years ago, there were lakes here bordered with fan palms, luxuriantly banked with ferns and reeds. A little higher on the slopes were yew-like trees and oaks. Beside the quiet lake shores lived the rhinoceros; the Oreodon, distant relative of the hog; the tapir-like animal, Lophiodon; the giant and savage peccary; the elephant; and perhaps more famous than all the others, the diminutive three-toed "dawn-horse". Here strangely they lived and died and were buried beside these ancient lakes during stupendous explosive eruptions from distant volcanoes.

According to an eminent paleontologist, long a student of this locality, this stretch of John Day Highway is perhaps of the greatest educational value of any highway in the world.

THE BLOCK MOUNTAINS OF CENTRAL AND SOUTHEASTERN OREGON.

In central and southeastern Oregon the traveller sees a series of remarkable mountains of the fault-block type which rival the Rift Valley features of eastern Africa. Here great segments of the earth's outer shell under pressure have been uplifted and tilted and <u>horsts</u> or upthrust block mountains are the result. The geologic structure most characteristic of the region is the so-called graben or elongated trough-like depressions between the uplifted blocks in which usually are found chains of lakes and playas (lakes which have no water in the dry season). Beach marks show that at one time some of these lakes reached a height of 200 feet above the present level. Facing these depressions are steep escarpments of several thousand feet, while away from these the tilted blocks have gently dipping back slopes. Among the typical block mountains of Oregon, Hart Mountain, Abert Mountain and Steens Mountain in the southeastern part of the state stand out as the most striking examples. Steens Mountain (named after Major Enoch Steens, U.S.A., who headed an expedition in 1860 which drove a band of Snake Indians over its summit) although not unlike the others, is "built" on a grander scale than any of the rest and is the highest mountain in southeastern Oregon. It comprises several hundred square miles and tilts toward the west. On this side there is a long gentle slope of only a few degrees. The east side, however, is a steep and rugged escarpment, deeply incised by high gradient stream valleys, rising 5000 feet above Alvord Valley. On one side a man can ride a horse at full gallop; down the other only mountain goats can make their way safely. Large bands of sheep, watched over by their friendly "Basco" (Basque) herders and faithful dogs, feed on the gentle back slopes and have the distinction of being the highest bands in Oregon, grazing at an elevation of 10,000 feet.

Early in the summer each year hundreds of people from all over the state drive up the road cut into the precipitous face of Hart Mountain to attend the annual Round-up and barbecue of the Order of the Antelope. Hart Mountain, almost treeless, drops gently eastward to meet the back slopes of its big brother, Steens. Visitors may search for opals on the very edge of an escarpment that falls over a thousand feet to the valley below, under its precipitous western wall. Here bands of fleet-footed antelope wander over rolling hills purple with fragrant sage, here the fast vanishing eagle screams from his nest on the "rim-rock" and the coyote begins his lonely vigil with the first shadows of darkness.

THE DESCHUTES AND CROOKED RIVERS.

These two remarkable streams (The Dalles-California Highway) flow practically throughout their entire courses in volcanic formations either of lava flow or pyroclastic (fire-broken rock) materials. The Deschutes is noted for its even flow of water throughout the year, which is primarily due to the porous nature of the rocks. The Crooked River exhibits, particularly at the famous Crooked River Bridge, a few miles north of Redmond, intra-canyon flows of lava in which a new canyon has been cut. In a word, the present river has exhumed evidence of still older canyons which have been filled with lavas.

FORT ROCK.

Fort Rock received its name from its appearance rather than the allegation that it was once used by white men as a fort against the Indians. This roughly circular shaped landmark, standing alone on the plateau southeast of Bend near Oregon State Highway 54, is 37 miles southeast of Lapine. It is approximately a mile in diameter and its highest point is faced by a perpendicular 200-foot wall, rising 325 feet from the plain on which it rests. This great mass of rock is of volcanic origin and its present shape appears to be largely the result of erosion of an old volcanic neck. In its vicinity are old lake deposits overlying still older flows of lava and intercalated volvanic fragmenta. Due to folding of these older formations the Fort Rock country is an artesian basin.

NEWBERRY CRATERS.

Twenty-five miles south of Bend (reached by Highway 97 and branch road) in the summit of the isolated Paulina Mountains at an elevation of approximately 6500 feet lie the Newberry Craters, in which are nestled two beautiful, crystal clear gems - Paulina Lake and East Lake. It is apparent that these lakes at an earlier time were not separated, but subsequent lava flows divided the crater leaving East Lake without inlet or outlet. In accordance with the latest investigations it is believed that this great caldera is due to faulting and collapse. Although the western rim has been broken down, in other places the walls rise high and precipitous above the lakes. From the rugged, timbered heights of Paulina Peak standing southward 2000 feet above the lakes, the snow-capped peaks of the Cascade Range may be seen spreading themselves out in a spectacular panoramic fan, giving the traveller one of the most inspiring views in the entire state.

Near East Lake is perhaps the largest mass of volcanic glass (obsidian) to be found in Oregon. Here where the traveller stops to examine the glassy, grayish-black surface of obsidian glistening in the sunlight, the Indians in early dates came to gather material for their arrowheads, knives, and other instruments.

On the northern slopes of Paulina Mountains is a remarkable geological exhibit of lava casts of former forest trees which may come to rival similar features found in Hawaii. These were discovered several years ago by Mr. Walter Perry of the Forest Service.

Out on the High Desert east of the Paulina Mountains are many interesting geological features which we can barely mention in this article, such as Fossil Lake, now dried up, but which in Pleistocene times harbored the flamingo and other animals now vanished from the Oregon scene. In the dried up lake bottom of Thorn Lake are some strange-looking clastic dikes which have been regarded by local residents as the ruins of the walls of an ancient city.

At several places, notably near Bend and some distance east of Klamath Falls, are those intriguing lava-river tunnels and ice caves continually being explored by tourists and scientists.

CLEAR LAKE AND ITS "GHOST FOREST".

About a thousand years ago, more or less, lava streamed westward down from Belknap Crater and flowed into the old valley of the Upper McKenzie and dammed it, producing beautiful Clear Lake, beneath whose cold quiet waters is buried a ghost forest. This spring-fed lake lying at an elevation of 3030 feet, covering about two square miles, is 190 feet at its greatest depth, and is a mecca for fishermen. The submerged trees of this ancient forests of the Cascades were "drowned standing up" when the lavas dammed the canyon. Some of them are nearly three feet in diameter and they are perfectly preserved specimens of the trees now growing on the neighboring hillsides.

As one looks down into the shallower waters of the crystal clear lake he will see a creamy white deposit on the bottom. This is diatomaceous ooze which wen examined under the microscope reveals myriads of tiny crescent-shaped lenticular bodies which are the outer casings of the primitive single-celled plant known as a diatom. These lowly organisms are living and flaating in many lake waters of Oregon today. When the plant dies, its "shell" sinks to the bottom. In several localities in Oregon, there are extensive thick deposits of these representing the accumulations in prehistoric lakes from which the water has entirely disappeared. The most important of these are the Terrebonne deposits located a few miles north of Redmond on U.S. Highway 97, and the Harper deposits in Malheur County near the little town of Harper on U.S. Highway 28. This diatomaceous earch, or diatomite, as it is called, has considerable economic value, as it has something like a hundred industrial uses, such as filter material, paper filler, insulating material, and cosmetics.

THE REGION OF THE THREE SISTERS.

Before reaching the summit of the McKenzie Pass (elevation 5324 feet) U.S. Highway 28 passes through one of the most recent lava flows in the United States - many square miles of rock so gnarled and cruelly jagged that even the rugged mountain hemlock and white pine find little welcome on its sinister surface. A mile to the northwest and a thousand feet higher stands Belknap Crater, source of much of the surrounding lava, and beyond, on a clear day, Mr. Hood, Mt. Jefferson, Mt. Washington and Three Fingered Jack outline themselves in bold relief against the blue horizon. To the south, in sharp color contrast to the surrounding drab lava-strewn terrain, rise the snow-crowned Three Sisters to an elevation of over 10,000 feet. These are apparently young mountains which have grown up within the wreck of a formerly existing mountain of much greater proportions to which has been given the name of Mt. Multnomah. This "ancient ancestor of the Three Sisters" was, according to E. T. Hodge of the Oregon State College, one of the largest volcanic peaks of the entire western cordillera of North America.

An easy forest trail from Frog Camp near the highway leads one through clusters of snow-bent timberline trees, into high mountain meadows carpeted with alpine asters (Aster alpigenus) and hundreds of other wild flowers, along milky White Branch bordered with purple paint brush (Castilleja oreopola) and shooting stars (Dodecatheon Jeffreyi) and quickly ascending over morainal material, gives an inspring view of Collier Glacier, the largest glacier in the state.

THE GOSHEN FLORA.

In the upper Willamette Valley, five miles south of Eugene on the Pacific Highway (U.S. 99) where the timbered foothills of the Cascades on the east and the forest clad slopes of the Coast Range on the west encroach upon the farm lands, was found a remarkable assemblage of fossil leaves entombed in a fine-grained volcanic ash deposit. They represent trees that lived several millions of years ago and whose affinities are now flourishing in Panama and the Philippines, unmistakeable evidence of a tropical climate at that remote time in this part of Oregon. Since the completion of the highway, this site may be easily located, though the best specimens have long since been removed to private and public collections, chiefly those of the State College and the Universities of Oregon and California.

(To be continued)

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed

PORTLAND 4 OREG.

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 22 | Portland, Oregon | Nov. 25 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscription $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * ANNOUNCEMENTS *

Lectures

Friday Dec. 9 : Mr. Thomas A. Carney. "A Geological Fantasy, by an Amateur Photographer", the geological wonders of the National Parks, in moving pictures. Mr. Carney takes exceptionally fine pictures and a large part of his exhibition consists of color film. Mr. and Mrs. Carney toured a number of the National Parks this summer, and this account of their vacationings should be particularly pleasant. Be sure to save this date.

NOTE : There will be no lecture on Nov. 25th, which immediately follows Thanksgiving, nor on Dec. 23 which is just prior to Christmas Eve. It is not the policy of the Geological Society to pass any lecture date, but it is considered that this arrangement is most advisable, under the conditions.

Field Trips

None Scheduled.

NEW MEMBERS

Gerald William Breese
Apt. 4, 1st Natl.Bank Bldg.
Forest Grove, Oregon

Mr. and Mrs. Charles Hogan
4411 S.W. Third Ave.
Portland, Oregon

Miss L. Kate Rosa.
807 S.W. 14th Ave.
Portland, Oregon

Violet R. Christenson
434 Mead Bldg.
Portland, Oregon

* * * *

On Thursday evening, November 10, 1938, Clarence D. Phillips made an informal talk on some of the geological features of Oregon before the members of Oregon Commandery No. 1, Knights Templar of Oregon.

Thomas A. Carney showed moving pictures at the Benson Hotel Sunday November 5th to a group of about 100 people, - a birthday party for Dan Marx, diamond merchant - 87 years.

In the November issue of "THE SKY", the monthly publication of the Hayden Planetarium, New York, is published the photograph and table included in Carl Richards' article on the total eclipse of the Moon last May, which appeared in the July 10 issue of the "Geological News-Letter". Credit is given to Mr. Richards for taking the photograph, but no mention is made of the fact that it was taken in Portland, Oregon. True, the times stated are designated "P. S. T.", but Pacific Standard Time covers a wide territory. Can it be that our California brethren are seeking to capture this eclipse along with Mt. Hood, Multnomah Falls and other items of our scenic assets?

(Ed.note) The following article is printed at the request of Bibliofilm Service; it is data on an unique service available to those interested in scientific work).

Bibliofilm Service in Geological Survey

To give research workers throughout the country access to further materials for their work, a Bibliofilm Service has been opened in the Library of the Geological Survey, United States Department of the Interior, Washington, D.C. Through the courtesy of Guy E. Mitchell, Librarian, it is now possible for a scholar anywhere to order copied any properly copyable extracts from the quarter million books, journals and rare materials in this leading scientific library, as well as many of its fifty thousand maps.

Bibliofilm Service is operated on a non-profit basis by the American Documentation Institute under a cooperative agreement with the Library of the U. S. Department of Agriculture, and also maintains copying installations in that Library and the Army Medical Library. It acts as a national clearing house for copying orders for research materials, filling them through its own and other services, for materials located in substantially all Washington and Baltimore libraries, bureaus and institutions and in other cities here and abroad.

Copying is done in either of two forms: microfilm (a series of still images on 35 mm. standard safety photographic film comfortably usable in reading machines now widely available) at 1 cent per page, plus fixed service charge of 20 cents; or in the form of photoprints (6x8 in. legible without optical aid) at 10 cents per page; plus service charge of 20 cents.

Inquiry should be in the form of a definite order for the copying of specific materials; if available and properly copyable the order will be filled. Order blanks making a letter unnecessary are available free on request. Remittance must accompany order, or an amount of $5 or more may be sent to open the usual deposit account which saves the bother of remitting small sums. Information on reading machines may be obtained from Science Service, Washington, D.C., who also supply a hand viewer invented by Dr. Atherton Seidell, suitable for reading short abstracts, at $1.50.

The additional resources now opened to research workers everywhere, through Bibliofilm service in the Geological Survey Library, comprise everything properly copyable among over 250,000 volumes including geology, mining, paleontology, mineralogy, chemistry, 50,000 geologic and other maps, United States and foreign; some 1200 foreign and domestic periodicals and serials including reports of State Surveys, and Mining Bureaus, all governmental publications on the above subjects, and the geological publications obtained by exchange from every foreign government.

There are many surprising finds, items not duplicated in any other American library; some exceedingly rare and useful aggregations.

Remittance for copying material in the Geological Library, or material in other fields located in other libraries, should be made payable to American Documentation Institute and all orders for copying should be mailed therewith to Bibliofilm Service, care U. S. Department of Agriculture, Library, Washington, D.C.

HIGHLIGHTS OF A

GEOLOGICAL TRAVELOGUE THROUGH OREGON

By Warren D. Smith
University of Oregon

(Continued)

(Ed. Note: The following manuscript was published, in part, by the Oregon State Highway Department. It is thought that the complete manuscript will be of interest to members of this Society, and permission for its use has been granted by Dr. Smith, and by the State Highway Department).

THE ROGUE RIVER.

Although according to all authentic historical data, the Rogue River in southern Oregon may credit its name to the troublesome Indians, Les Coquins (the Rogues) who lived and fished along its course, there are many people today who still believe that the name originated from the roguish, turbulent and in many places treacherous waters of the stream, which cuts and cascades much of its way through a narrow rock walled gorge from near the summit of the Cascades to the sea. It is known as an antecedent stream - one which is strong enough to maintain its course regardless of obstructing barriers - in this case rising folds of rock which came up gradually in its path.

Although Highway 62 from Medford to Crater Lake runs for a number of miles along the upper Rogue, only a well-built government trail, which has supplanted the old Indian trail, follows the lower course of the river which is world famous for its steelhead fishing.

Since the early days after '49 the river has been famous historically for gold, much of which is found in gravel deposits on benches far above the present channel. But perhaps even more important than gold are the deposits of chromite in the bluish-green serpentine formation which is found in this region. Chromite is an important industrial mineral which was mined during the World War in Oregon but had no market afterwards, and has only recently come into demand in the production of rustless iron and steel.

THE AGATE DESERT.

South of the Rogue River near Medford is the Agate Desert, well-known for the beauty and fine quality of the agates found there. This comparatively barren stretch of terrain, dotted with hundreds of low hummocks is the result of erosion of the former plateau, of which Table Mountain near the highway (U.S. 99) stands as a remnant, and more recent deposition of stream gravels derived from the high country to the eastward.

CRATER LAKE.

On the crest of the Cascades of southern Oregon is the setting for one of the most remarkable scenic features of the world - Oregon's own Crater Lake.

At an altitude of 6161 feet, this blue gem of the Pacific Northwest is guarded by a nearly circular rim, varying from 500 to 2000 feet in height. It has a shoreline of approximately 21 miles and is $6\frac{1}{2}$ miles in diameter from east to west and about $4\frac{1}{2}$ miles from north to south and is 1996 feet deep at the greatest depth yet sounded. The materials in the crater walls and the inclination of the back slopes indicate that, prior to the formation of the lake, a majestic mountain, known to geologists as Mt. Mazama, reared its lofty head 12,000 to 15,000 feet. The origin of Crater Lake is a matter of controversy among geologists, and the problem excites the curiosity of thousands of visitors to this famous national park. There are two theories as to the origin: one that the crater is the result of the subsidence and collapse of Mt. Mazama, the explanation first proposed by the late veteran geologist, Diller; the other that it is due to a terrific explosion and the blowing off of the head of the prehistoric mountain. Perhaps a combination of the two will be found to be the true explanation.

The world traveller, standing silently, almost reverently a thousand feet above the indigo-blue lake, among the fragrant hemlock trees clustering its glacier-notched rim, looks down at Wizard Island, the posthumous child of old Mazama, or away at the Phantom Ship ready to sail into the sunset, and he forgets the scientific discussion of origin. He is content to let Mazama rest in peace and its present beauty, and hearken to the sounds that come from the "further side of silence".

* * * *

PORTLAND NEEDS A MUSEUM

One important thing Portland has lacked all these years is a central Museum of Natural History.

The Oregon Historical Society has a splendid collection of historical exhibits now housed in inadequate and restricted quarters in the City Auditorium.

The City of Portland has a fine collection of minerals, Indian artifacts, marine exhibits, fossils, etc., that are now stored merely in the basement of the City Hall, inaccessible and rapidly deteriorating.

The State Department of Geology and Mineral Industries is gathering a collection representative of the economic geological and mineralogical resources of the state. That Department is charged by law to create and maintain a museum but so far insufficient funds have been provided with which to acquire museum space, so their specimens are now stored in boxes and not available for study by the public.

One of the most important exhibits of such a museum would be underwater life as displayed in a modern aquarium including both fresh and salt water living specimens of plants and animals. The sponsors for such exhibits would be the Izaak Walton League and the State Fish and Game Commissions.

The Geological Society of the Oregon Country, the Oregon Agate and Mineral Society, the Oregon Audubon Society, the Oregon Stamp Society, and others, have collections that are unseen and unsung because of lack of display space.

There are a large number of private collections that would come out of hiding and be placed on display if proper facilities were offered. Such collections are "loaned", which virtually means possession by the museum as long as display space and proper care are provided.

Such a museum should not be considered alone for purposes of display and show but workrooms and laboratories should be provided where exhibits can be analyzed and studied and where special research work can be carried on. It should also contain an auditorium having lantern and movie facilities to serve as a lecture room as well as a meeting place for outdoor clubs and societies.

In addition to making accessible to the general public all of the various exhibits, specimens and historical records, it is well recognized that the safe-keeping of such records and materials for the benefit of future generations is one of the important reasons for the existence of the proposed museum. The burning of the State Capitol building with consequent loss of valuable and unreplacable records is a recent example of what can happen. Such losses can be prevented by providing adequate museum space and security for all such records and exhibits.

HOW CAN SUCH A MUSEUM BE CONSTRUCTED?

Promises have already been made by Mr. Griffith, Administrator of the Works Progress Administration in this state, that his organization will undertake the construction of such a museum if proper sponsorship is provided. It is with the hope of stimulating interest in such sponsorship that this brief has been prepared.

The locality tentatively selected is in the Holladay Park block - probably adjacent to the proposed Civic Theatre which WPA is arranging to construct as soon as certain details have been cleared.

Roi Morin, architect, has prepared tentative plans for a museum building having three stories, two wings, and a meeting room. The dimensions of the building as tentatively outlined are 50 feet by 140 feet, and of each wing, 50 by 95 feet, with a total floor space of 60,000 sq.ft. Its cost is estimated at about $125,000. These dimensions are, of course, subject to revision as detailed plans approach realization.

HOW CAN SUCH A MUSEUM BE MAINTAINED?

It would be unwise to construct such a museum without making adequate provision for its maintenance and operation. Revenues for this purpose may be expected from a number of sources which are set forth as follows:

(a) The State Legislature, which is now making biennial appropriations for the Oregon Historical Society, for the State Department of Geology & Mineral Industries, and for the Fish and Game Commissions, might be willing to earmark certain funds for maintenance. Inasmuch as these departments must pay rent out of their appropriations in any event, it would be sound business for the State to contribute to the museum, either as a sponsor's contribution or with maintenance funds.

(b) The City of Portland should include a definite sum in its budget to defray the cost of keeping its collection on display.

(c) The State Game Commission and the State Fish Commission should contribute sufficient annually to take care of the aquarium and attendant facilities.

(d) Charges could be made for the use of the auditorium on special occasions.

(e) A small portion of the dues of each of the organizations having exhibits in the museum could, if necessary, be set aside as a museum maintenance fund, since the membership in such societies would be enhanced by reasons of the display space and lecture facilities afforded.

PATRONAGE

The popularity of such a museum was well illustrated by the great interest shown in the fine display made by the Associated Agate and Mineral Societies during their recent convention at the Multnomah Hotel. Over 1500 visitors viewed the collection in one day!

It is certain that such a museum as is herein proposed would become a veritable mecca for residents of the City and State as well as for tourists. That this has been the history of such enterprises is easily demonstrated.

(Museum Committee)

(Some notes on the talk by Mr.Morris Opler, of Reed College, on April 8,1938)

CULTURES OF THE INDIANS OF THE AMERICAN SOUTHWEST.

Anthropology. The word means, study of man. The anthropologist has one foot in biology, and one foot in social science. The study of his origin and physical traits must be a part of the study of man; the social aspect, the study of the pre-literate man, the man who had traditions, is another phase.

Particular peoples of the American southwest I have studied are the various Apache groups. The Apache people lived in New Mexico, Arizona, and northern old Mexico. We know they came from the north. People who speak the same language, the Athapascan language, live in the Mackenzie valley. They have moved southward in the last 500 or 600 years, and have been invaders into the Pueblo area in the American southwest.

In the American southwest you have people who have lived there for a rather long time, and had built up a rather interesting, highly developed culture. At one time they were basket makers, and did not have agriculture. Later on they did become agriculturists, got it from the south. They became more developed, and lived in towns or pueblos, and we call them the Pueblo peoples of the southwest.

The Apaches were not sedentary. They were nomads who came from the north with a much cruder culture. They invaded the Pueblo region and actually caused it to contract, for the people were unable to protect themselves from these invaders. The Pueblos were, and are, quite peaceable. You have heard of the Hopi. The word means peaceful. They had no desire for expansion. Their tactics were purely defensive. They built their Pueblos on high mesas which were quite impregnable, and were willing to stand the inconvenience of going up and down from the fields below. It is a pretty stiff climb. They did it all the time, bringing water up to the mesa, and thought it a small price to pay to have the feeling of being pretty secure.

Sometimes the pueblos were not so well placed, and so the Indians moved. When these Apache marauders came into the region, there was a disposition on the part of the weaker pueblos to unite with others. So the Pueblo region was already in quite a state of disintegration, due to the Apache invasion, at the time of the Spaniards.

The Apaches, after a long residence in this region, became interested in some of these agricultural pursuits. They began to raise a little corn, and to be a little less mobile, to wander around a little less. They still depended on hunting and gathering. Had this gone on, these people would have taken on the agricultural arts and become less warlike, less bellicose, and a little less nomadic.

While we study anthropology, we are studying man, not particularly the American, nor the western European, but man. It is an interesting thing to know how history repeats itself, just what processes are common to all epochs, all peoples. We want to get at the core of what is human nature. I spent five years studying these peoples of the southwest. We knew these people had once been a unit of the Athapascans, spoke dialects of the same language. They had somewhat different customs, but despite the differences, were all of the same basic stock.

I wanted to know the influence of the geography and climate upon peoples. They had spread to different environments. Those to the eastward were in contact with Plains Indians. They also came in contact with the Pueblos, Comanches, Utes. What of these various cultures, what influences did they have on these people? I noted what were the different variations, made a study of these tribes, seeing what they all had in common. I also asked in what were they different, and how to account for these differentiations. Was it climate? Here was the opportunity to test these various factors.

We stayed around and learned who the interesting people of the community are, who the trustworthy people are, who the important people are. There are a sufficient number of people in any community who are particularly interesting, and are very solicitous about having their traditions preserved, who want it recorded. This culture they knew was passing out of existence. They would like to have their grandchildren and the young people know something of it. They want it preserved. There is always a serious informer in each community. Some are a great deal more serious, and want these things recorded very accurately and faithfully. It may be that one informant will not tell you about his belief in the supernatural. He may refuse to give you that information. In that same community, if you find someone else who will talk, it is pretty sure that he will tell you the truth, however.

These Indians are very detailed and exacting regarding some of their ceremonies. Countless little gestures which get quite boring to the white man are important in the prescribed way. If I had been guilty of some little error in recording, it did not get by my informant. They are very punctilious schoolmasters and instructors.

The Chiricahua Apaches used to live in part of Arizona, in part of New Mexico, and in part of northern old Mexico. They are rather famous in history because they led one of the last Indian outbreaks in the region, the Indian wars of 1886, when the tribal leader, Geronimo, took some of his followers on raids into Arizona and into old Mexico. He was followed by U. S. troops from 1877 until 1886, when he was finally captured. They took the entire tribe from the far west, took them first to Florida, then to Alabama, where they were prisoners of war, then to Fort Sill Oklahoma, until the outbreak of the world war. Then their status as prisoners of war was terminated and they were allowed to come to New Mexico and to live on the Mescalero reservation in southern New Mexico. Some preferred to stay in Oklahoma and took up farms, and are living much as the white farmers around them do.

I worked with the son of Geronimo and other relatives of his, worked with a great many of those old men who participated in the war. Very few of them went out with Geronimo. Most of them stayed on the reservation at the time of the outbreaks and worked with the U. S. Government to capture Geronimo. They consider it very unjust that the innocent and the guilty alike were punished. They think it is very doubtful that, without their aid, the U.S. military would have been able to catch up with Geronimo. The Chiricahua enlisted and helped track down Geronimo. I frequently worked with two old men who went alone to the fastness of Geronimo and induced him to surrdnder to General Miles. For their pains they were all taken prisoners, taken from their high lands, and removed to low damp country where they died like flies.

What are some aspects of the culture of these people? They did have well organized institutions of a very definite type. If you were an Apache, you knew what was expected of you. You were acquainted with it early, and it was brought to your consciousness more sharply than is the case with our own institutions. An Apache knew exactly what was expected of him as a citizen of Apache society, largely because the society was small and close-knit, and in that no one departed from any regular tenet of social behavior. They keep track of everybody. It is very difficult to sidestep or violate the code under such conditions.

There was an established code. The primary social group was the family, parents and children, married daughters and their husbands. When a woman married she stayed with the family, in the parental encampment. A man comes over to his wife's family. He has certain obligations. One is that he must avoid his mother-in-law. He has to avoid her, and if he is a Chircahua, he will have to avoid his father-in-law. He may have to avoid the sister and brother of the father-in-law and mother-in-law if they request it. It is all worked out in the unwritten rules of the south.

These more remote relatives of the wife establish the relationship with the man. They may ask him to use "polite form". This is a certain third person part of speech. It indicates a great deal of restraint, a great deal of respect. It isn't just a matter of speech, but along with that matter of speech goes other things. If I use it to a person I am obligated to help him out economically. For, with more strained, dignified relationship, it would be most impossible for me to refuse his request. With this speech goes the behavior pattern. The Apache knows, when addressed in that way, all the things he must do in response. It was part of our work to discover these relations, tracing their range. I discovered that there were some people they had to avoid, some other people they could avoid, and some they might have to avoid if requested. Avoidance or polite form was begun the first time they see you after the marriage which establishes the relationships.

So the whole thing is worked out according to the scheme of action. There are a good many English speaking informers who are bilingual. One gets lots of information from some who have lived only a comparatively short time under aboriginal conditions.

Burial Customs.

There is nothing these people are quite so afraid of as the corpse, because they believe that at death, the good element leaves. They see, as we do, the battle between good and evil. At death, the breath, which is considered the soul, goes to the underworld, and the body - that is, the repository of what is eveil, what is finite, what is warthly in men, is left. Sickness and evil come to the world through the body. The great horror, the thing to fear for men, is death. Death and the body spell evil for living Apaches.

A few hours after death occurs, the body is disposed of. In this region they take it to a mountainous place and bury it in the talus, and get away as soon as possible. They do not want the young people to come in contact with the body. It is a matter of haste, the burial being conducted by the old people. And all the property of this person is destroyed, because the memory would invoke grief. The dead person wouldn't want them to grive, they say, and so wants his goods destroyed.

The Apache do not allow anyone to mention the name of the dead. The house in which he lived must be disposed of. The people in this house have to move camp. The house is always abandoned at death. If not, the ghost of the dead person will come back. You can get ghost sickness. We call it heart disease. They have special ceremonies to drive away the ghost and make the person well. When an owl shrieks, it is a sign that the ghost is around.

These Indians have a rigid and codified form of social life. Superstitions are dying out, though they are still strong. Not so strong with the young people.

A good many of them used to use native dyes, various ochres, browns and reds, very soft and very beautiful, in making objects of material culture.

They don't use the name as a matter of identification. The name is used only in time of crises. It is very personal, very precious. The name has to do ordinarily with some personal trait; "long-nosed one" would be an example.

Animal calls are used a great deal, also calls of birds of a region. Bird calls were used extensively as a warning, as well as smoke signals.

* * * *

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed

PORTLAND 4 OREG.

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 23 Portland Oregon Dec. 10 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscription $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * ANNOUNCEMENTS * * * * * * * * * * * * * * *

Lectures

Friday Dec. 9th :	Mr. Thomas A. Carney, "A Geological Fantasy, by an Amateur Photographer", the geological wonders of the National Parks, in moving pictures. Mr. Carney takes exceptionally fine pictures and a large part of his exhibition consists of color film. Mr. and Mrs. Carney toured a number of the National Parks this summer, and this account of their vacationings should be particularly pleasant. Be sure to save this date.
NOTE :	There will be no lecture on December 23rd, which is immediately prior to Christmas. It is not the policy of the Geological Society to pass any lecture date, but it is considered that this arrangement is most advisable, under the conditions.
Friday Jan. 13th :	Doctor Ira S. Allison will lecture on some phase of the glacial drainage on the Columbia plateau in relation to the Scabland problem. The glacial drainage, with its early discussion as the "Spokane Flood" of J. Harlan Bretz has aroused considerable discussion among geological students. Dr. Allison has spent a great deal of study on this problem and is particularly well fitted to handle the subject.

Field Trips

Sunday Dec. 10th :	Leader, Leo Simon. Dallas, Hopewell, Amity. Leave 6th and Yamhill at 9:00 a.m.- A visit will be paid to the Dallas limestone quarry where Eocene fossils may be found. A basalt quarry between Amity and Hopewell exposes some very interesting geology that is guaranteed to start several arguments.

News Notes

Dr. Adolph Wienzirl, city health officer, addressed the East Side Commercial Club on Nov. 30th. His subject was "The City's Health".

Ray Treasher talked to the Oregon Agate and Mineral Society on Dec.9th. Subject, "The Wallowa Mountains".

We are glad to announce that John Piper, young son of Arthur M. and Mrs. Piper, is back in school after having been hit by an automobile on the evening of November 14th.

John was crossing N.E. Fremont Street on the way home about five o'clock in the evening in that dangerous late twilight when he was struck and apparently thrown across the intersection. He sustained a deep gash over one eye and a slight concussion. X-ray failed to show any fractures and after four days in the hospital his daddy took John home where his mother could add the finishing touches to his recovery.

Members of the Geological Society of the Oregon Country join with Mr. and Mrs. Piper in being thankful that the accident was not more serious.

MAZAMA PHOTO EXHIBITION

The annual photographic exhibition of the Mazamas was held during November and, as in former years, attracted the interest and attention of several members of the Geological Society. The opinion was widely expressed that, for sheer quality of the pictures shown, this year's exhibit ranked more highly than any previous one. That is saying much, for the Mazama exhibition has built for itself a reputation as one of the outstanding displays of mountain and outdoor phtography.

Of special interest from the geological standpoint were H.G.Thorne's Grand Canyon views, the tinting of which by Mrs. Thorne faithfully captured the spirit of those colorful panoramas. Some excellent 11" x 14" enlargements by A. H. Marshall of Vancouver (famed as the only person who has set foot on the highest point of every one of the 48 states) showed unusual views of the Natural Bridges in southeast Utah and of the wonderful rock formations of Wheeler National Monument.

For excellent portrayal of snow scenes in high places it would be difficult to find better examples than those of Ray Atkeson, Ted Gable and Irving Lincoln, and, for studies of glacier ruggedness, the pictures of Donald Onthank, president of the Mazamas, taken in the Mt. Baker region, were exceptionally fine. Central Oregon and the Steens Mountain country were represented by a splendid series of views by Alfred Monner, whom members of our Society know as the expert in picturing those regions. Other exhibitors, each revealing an individuality of technique, had similarly noteworthy pictures, which made a visit to this exhibition a worth while and pleasant occasion.

Those who were unable to see the exhibit may have another opportunity, as it is expect that, following the practice of the last few years, it will be shown again early next year in the show rooms of the Northwestern Electric Company at S.W. Sixth Avenue and Taylor Street.

The following members of our society exhibited pictures:

Miss Mella C. White
Franklin L. Davis
Carl P. Richards

* * * * *

STATE DEPARTMENT ANNOUNCES NEW ADDRESS

The State Department of Geology & Mineral Industries announces that its new address is 329 S.W. Oak Street. This location is on the ground floor of the Lewis Building, the move consisting of a transfer from the seventh floor to the first floor. The offices are now much more accessible to the public, as the street entrance puts them right into the midst of things.

Considerably more space is available to the Department by this move and the office space is much more usable. Visitors are welcome, as before; the telephone number remains the same, BRoadway 2276.

THE G. S. O. C. SUMMER CAMP AT WALLOWA LAKE.

July 4 to 16, 1938

H. B. Schminky, leader.

INTRODUCTION.

It is natural to expect that a society such as our should sponsor a summer camp. But the past attempts to get the members to spend all or a part of their vacation at a point of geologic interest as a group have been disappointments to the leaders. It was with much misgiving that I told our president that I would accept the chairmanship for another summer camp project.

We felt that the general outline for such a camp must be made up far ahead of vacation time, so that all who might be interested could arrange their time to that of the camp. A list of 17 localities for such a camp was submitted to the members in October, 1937, so that the most popular locality could be chosen. No final results came from this list until April of this year. Wallowa Lake was the locality chosen and the date was set for the first two weeks of July.

Letters were sent in search of camping places other than the regular resorts, and to find all possible information on roads in the area. Mr. J. F. I[illegible]n, supervisor of the Wallowa National Forest, supplied much valuable information on the roads and on forest camps. The Chamber of Commerce at Enterprise gave some information on other accommodations. We finally decided on the Edelweis Camp, operated by Mrs. T. H. Williamson, as our headquarters, and it proved a most satisfactory choice. We finally worked out a muster roll, and to those attending the leader gives his heartfelt thanks for the success of the camp. They were all grand sports.

To Dr. Francis Jones goes the thanks of the entire group for his most interesting and instructive talks on not only the rocks and minerals we found, but the flowers as well. The leader is grateful for his help in many ways and also for his write-ups for the trips on July 6th, 9th, and 14th that appear in the following article. Thanks are given to Miss Myrtice E. Fowler for the use of her diary from which I have quoted in the write-up of our days in camp.

For our geological guide books we had the "Ore Deposits of Northeastern Oregon" by Arthur M. Swartley and "The Geology of Part of the Wallowa Mountains" by C. P. Ross. With the aid of these publications we were able to see the geological features of the mountains, to identify many of the rocks, and locate several of the old mineral prospects. My copy of "Ore Deposits of Northeastern Oregon" is practically worn out from carrying it on the various trips, as it deals more completely with the area that we explored..

The account of the summer camp is written in "dairy" style as it is a day by day chronology of our activities. We attempted to record all our impressions, not only of the rocks and minerals but of the scenery, the landscape effects, the pleasures and disappointments, just as they occurred.

Re-reading the "dairy" shows need for considerable revision of wording, etc. However, it is submitted, "as is", as it constitutes a more accurate record of our camp than if we re-worked it.

DAY BY DAY WITH THE CAMPERS.

July 4th:

The leader, with his wife and daughter, and his father and mother, arrive in the land of Joseph, chief of the Nez Perce. The welcome extended by the elements was almost as hostile as that of the old chief to the whites who were depriving his tribe of their homes. The storm clouds that had been threatening in the Blue Mountains were doing real business over the Wallowas. By the time Enterprise was reached lights were burning even though it was only a little after four in the afternoon. The landscape was an etching in black and gray. The mountains were only a black wall along the edge of the valley. Angry flashes of lightning broke the blackness. Rain came down in intermittent showers of varying densities. From Enterprise to the lake we met an ever increasing string of cars, as 4th of July crowds fled the downpours that ruined their holiday. Beyond the town of Joseph the highway wound across a low hill, which proved to be the terminal moraine at the foot of the Lake. Old Chief Joseph's grave was noted in the mist as we passed. Then we were at the Lake.

It was not the thing of beauty we had hoped to see. Or was it? The dome of the sky resting on the crests of the lateral moraines on either side, the wind trying in vain to erase some of the reflected blackness by kicking up whitecaps or tearing at the black cover itself to reveal patches of snow on the mountains above, was really a picture for any artist to paint. So on $4\frac{1}{2}$ miles to the upper end of the lake and Edelweiss camp, where Mrs. Williamson greeted us with her contagious smile and a promise of dinner after we had stowed our luggage in our cabin. "Dinner" was a dinner in any man's language, and the long drive had given us an appetite to enjoy it. When Mrs. Williamson told us that the rains had been plentiful throughout all of June, the leader had many misgivings about the outlook for the camp. Heavy showers lulled us to sleep when we finally turned in for the night.

Morning found the summits of the mountains free of clouds for a short time. When the clouds did come back, they were not as black as the day before, nor were the showers as heavy or as frequent. The advance party spent the morning greasing boots and salvaging the remaining dry wood from their wood pile. We were pessimism personified in regards to the weather even though we knew that Vance would not be at the camp. Afternoon found things much improved. We made a general survey of the area around the head of the lake while waiting the arrival of the rest of the party.

Conditions around the lake were very abnormal. The lake is used as a storage reservoir for irrigation water. The height of the dam at the outlet has been increased three times - the last about ten years ago. But until this year the run-off had never been enough to fill the reservoir. The late rains eliminated the need of irrigation water this year, so the run-off had continued to fill the lake. It now stood twelve feet higher than ever before and the rivers were still rising as the snow water was beginning to come out. Two cabins were flooded and a third was in danger. The boat landing had been moved three times. We cast many a questioning look at the heavens as we heard these tales. Light mists were all that fell during the rest of the afternoon, however.

The first G.S.O.C. car to arrive (about 5:00 p.m.) was that of Mrs. Edward A. Boyrie and her daughter Florence, with Dr. Francis T. Jones as their passenger. The Boyries had elected to camp out, so we all set to and had their tent up in a pretty pine grove before dinner.

Along toward seven o'clock the car containing Almeda Smith, L. Kate Rosa and her mother Mrs. R. Rosa, and Myrtice Fowler arrived. Everyone turned out to get them settled in their cabin.

Fourteen hardy souls were now assembled to test the possibilities of using two weeks of vacation time in geological study. The leader's hopes rose as starts took the place of clouds in the sky that night.

July 6th:

Since the late evening arrival of some of the party the night before had necessitated leaving the finishing touches of "camp stoking" until morning, the first organized activity of the G.S.O.C. summer camp was delayed until afternoon, although some reconnoitering was done by all in an effort to become oriented and to discover the general nature of the environing mountain peaks and valleys.

We found ourselves among tall trees, mostly firs, pines and larches, on the lower slopes of the mountain where our camp was situated, with alders, ash and cottonwood near the river which tumbled and tossed on its bed of glacial erratics down the middle of this U-shaped glacial valley into the morain-walled lake, where turbulence gave way to the placid stillness of deep sleep. As we looked out over the peaceful blue waters from the high morains walling them, with the deep valleys they had cut in the rugged mountains behind, we could feel that the rest had been well earned although we knew that this was only a brief rest on the long and tortuous trip to the sea, with much work yet to be done. It was interesting to ponder the number of times some of these same molecules had been carried back by the sun on the wings of the wind to be spilled on some mountain top, perhaps as a part of some delicate, lacy snowflake only to be squeezed into glacial ice, there to remain for centuries perhaps, slowly but relentlessly grinding and gouging a path, plucking at the mountain sides, carrying debris or rooting it along at the glacier snout, crowding the old moraines from previous glaciers into higher and higher piles until the sun-taking pity upon these tightly bound molecules warmed them into the freedom of fast moving streams, once again to help tear down the valley walls and carry a load to the sea.

We stood on the piles of boulders of all sizes and kinds and from an examination of the greenstones, granodiorites, basalts and limestones knew what we would be likely to find high in the mountains when we climbed the trail up the valley a few days later.

Having spent most of the afternoon climbing around on the terminal moraines and inescapably collecting hundreds of cheat seeds, we paid homage at Old Chief Joseph's grave, then examined the dam and the lake outlet before returning to camp. Many times we wished we might conjure Leo Simon out of some boulder to tell us what flowers or bird we had seen. In one place, a rock among the grasses, we disturbed a night hawk, which flapped away as though in distress in an effort to decoy us from its "nest" on the gravel beside the rock. We searched carefully before discovering the two mottled eggs which looked just about like the pebbles around them. It's a wonder the bird could find them herself.

July 7th:

The upper reaches of the Imnaha was the goal for the day's exploration-twenty miles as the crow flies, but forty odd miles by forest road southeast of Joseph. At Joseph a filling station attendant told us the rains and high water had made the road impassable about twenty five miles out. While debating the advisability of going elsewhere, a native of that section came by and the filling station man called him in. This man told us that the forest service crews were working on the road and that we could get through. We left the main road to the town of Imnaha about eight miles east of Joseph and traveled south along Little Sheep Creek for about two miles. Then the road climbs rapidly to the top of the lava plateau that lies between the Wallowa mountains & the Snake River. A most wonderful view of the north and east sides of the Wallowa mountains was had at this point. The fault scarp along their northerly face was easy to study. The east face of the mountains does not have the abrupt break of the north side. Several of the ridges extending out on the east side were capped with basalt, and the dip of this basalt was decidedly towards the lava beds on which we were standing. Off to the northwest we could follow the basalt cap over many of the higher points. The characteristic stair step and talus slope of the lavas is so different from the erosional features of the other rocks of the Wallowas that it is not difficult to pick out the basalts as far as you can see them.

The road now followed the divide between Big Sheep creek and Little Sheep creek. The general appearance of the terrain was that of flatness, yet there was a steady rise as we traveled southward, and the Fowler diary reminds me that we reached an elevation of 6100 feet at the brink of the Imnaha canyon at the head of Lick creek. Pine timber with a carpet of flowers made our journey as if we were traveling through a park. Many vistas of the east slope of the Wallowas opened through the trees. Bedded sedimentary rocks could be detected in some of the ridges as we came closer to them, and it seemed more of a certainty that the basalt caps on several of the higher points had a dip that would meet the surface on which we traveled.

We saw many areas containing mounds similar to those of the Warm Spring Indian reservation. They were formed before the present stand of timber came into existence as there were trees growing on some and no on others. It was suggested that they may have been caused by windfalls in some older forest.

Our first view of the Imnaha canyon was very impressive. In the West it carves a long narrow gash cutting into the very heart of the Wallowas. To the east it is a deep gorge in the plateau we had been travelling. We could look over the south wall of the canyon as it was higher than our side. We classed the visible rocks in the canyon walls as basalts at the point where we stood, as several flows were visible and some had columnar jointing. These gave way to the greenstone to the westward.

Our road made many hairpin turns in its 2000 feet drop to the river. We did not see the line of contact between the overlying basalts and the greenstone we found in the bottom of the canyon as we made this descent, due to the talus from the upper rock or the moraine material left on the side of the canyon.

We stopped for lunch on the bank of the river in the midst of a bed of flowers (some twenty varieties were picked according to the diary). It was hard to leave such a beauty spot but the road was open for another three miles up the canyon and our curiosity was aroused.

There was much evidence of glacial scouring to be seen as we traveled along. The greenstones were rounded and grooved in the most approved text-book manner. Roches moutonnes were so plentiful that it needed only a stone shepherd to complete the picture of a band of sheep grazing in the valley. But search as we did, not one specimen with striations was found for our collection - nor could we find a glacial shoe or faceted pebble. Much of the greenstone was cut by veins of quartz and in some of these veins we found small crystals of epidote.

At the end of the road we came on a gasoline well-drilling outfit set up in the bottomland of the canyon. In a tent near the rig one of the four men connected with the outfit was panning something. Well, that drew us to the scene of activities. But - to quote the diary - "we were not heartily welcomed, so we didn't tarry long." Our guess was that these men were testing the bedrock for gold by means of the drill and panning the bailings. They may not have had any claims staked so did not want outsiders to know their findings until they had located the richest area - at least not an army of pick-carrying geologists.

The shadows of the Wallowas were lengthening over the canyon so we turned our cars for the homeward journey. Even so, we did not hurry that return but made many stops just to view the beauty of the mountains and the flowers.

July 8th:

As we had not spent much time exploring the vicinity of our camp so far, we set this morning aside for that purpose. Referring back to the diary, I find that "our party walked to the power house, and to a viewpoint where we could see the rapids and falls of the West Fork of the Wallowa river as it tumbled down the mountain".

The power house is a unit of the Pacific Power and Light Company, located on the East Fork of the Wallowa river just above its junction with the West Fork. The water to operate the turbine is taken from a dam located on the stream at an elevation of about 1000 feet above the power house.

The rapids and falls on the West Fork occur in a box canyon carved in the so called greenstone series of rocks, which is a breccia at this locality. The viewpoint is a glacier carved pinnacle of this rock extending above the tree tops and furnishing an inspiring view of the valley from the falls to the lake.

The valley of the Wallowa river seems more like an alcove in the fault scarp of the northern face of the mountains than a real valley because of its shortness. One does not seem to sense its U shape. It ends abruptly at the base of Bonneville mountain which makes the divide between its two main forks. Both of these streams tumble down from valleys which are several thousand feet higher than the main valley. One cannot help but speculate on the sight made by the two glaciers that came out of these valleys as they made this drop. What noises must have thundered from this canyon at that time. The floor of the valley is now covered with glacial debris,which supports a lush cover of trees and grasses that keeps the elk herd contented to make it their home. Only those who have seen them, can know the thrills we felt to see these noble creatures in this setting.

Dr. Francis Jones and I climbed down into the canyon below the falls to take pictures and examine the gravel in the stream. We were surprised to find very little limestone or shale in these gravels. Greenstone and granodiorite were the main types.

In the meantime, the ladies, not knowing that the trail circled back to camp, started back the way we had come. Dr. Jones and I came back to the trail and continued ahead. So, to quote the diary again, "the feminine members lost the men of the party, but Bruce's whistle and Kate's lusty voice finally brought us together".

"That afternoon we drove to Joseph and then up Hurricane creek. We walked leisurely up the canyon trail and observed many interesting things, dikes particularly." The dike followed along the east canyon wall and seemed about half to two-thirds of the way up the slope. This slope is timbered and if the dike had not towered above the trees in cockscomb-like segments we would not have known it was there. The dikes that we had seen on the past trips only stood out from the rocks they cut by color contrast, and were eroded to the same level as the surrounding rock so that they could only be seen in treeless areas. Our future trips did not take us to any other area where such dikes exist, so we recommend that everyone going to the Wallowas should be sure to visit Hurricane creek.

"The sharp eyes of the men found greenstone, conglomerate,jasper, granodiorite, shales and marble. They wielded the picks so that all had specimens to carry back to camp". The shale rocks were very plentiful in this canyon. We were very much fooled by the way weathering affects these rocks. We would pick up a piece showing fine bedding lines of various shades of gray, yellow or green; then when we had broken it up for specimens we would find that the color was one uniform grey on the inside and that the whole mass was of such a uniform texture that it was hard to believe that we had a sedimentary rock. The greenstones were similar to those we had seen elsewhere, except that we found some that were conglomerates. Some of this conglomerate contained red jasper pebbles. We found specimens of what I will call rotten egg marble. This rock gave off a very noticeable odor of H_2S when cracked or rubbed. It is a rather fine grained yellow-white marble in which the crystals are not completely joined. Dr. Jones thought that the H_2S gas could have remained trapped in the interstices between the crystals. Between geology, botany, scenery, and just the comradeship of the trail, we were only able to cover about two miles of this interesting trail, before our watches told us to turn back to camp and food. Our hopes for a second trip into this area were never fulfilled.

July 9th:

The entire G.S.O.C. camp personnel headed for the Lostine river valley via Joseph and Enterprise, which are situated on the great glacial outwash plain which slopes gently toward the narrow gorge of the Wallowa river cut in the basalts which cover the valley floor. We could see these flows sloping up on top of the distant mountain ridges as we drove west toward Lostine. Looking back toward the lake we could see the great fault scarp formed during the uplift which heaved the mountainous mass thousands of feet above the plain. The densely wooded lower slopes lie up against the face of the scarp in sharp contrast to the naked rock clothed here and there with ragged strips of fast-thinning snow. The line of trees creeps higher toward the west until it reaches the top of the ridge where the fault pinches out. Here and there we could see a high hanging cirque, and perhaps a remnant of basalt on a high ridge. The Hurricane creek valley with a remnant of lateral moraine could be clearly seen, and as we started up the Lostine remnants of both terminal and lateral moraines were evident from their form and content of unsorted boulders seen exposed in road cuts.

After leaving Grandfather Schminky to fish in the river, frothing white in its rush to join the Wallowa, we inched on up the valley with frequent stops to investigate the formations along the road. The first rocks we found in place were metamorphosed sediments from an ancient sea. Farther on we found diorite and granodiorite rocks from the great batholithic intrusion and on top of it where steep valley walls prevented growth of vegetation we could see white marble with here and there a dark line of younger intrusive basalt.

Farther up the valley its U-shape became more apparent and tributary glacial valleys with snow-filled cirques at their heads became conspicuous.

The frequent stops necessitated by our hungry curiosities (don't misunderstand!) delayed us until some of the party threatened to devour what lunch they had in the car even before we reached Sheaffer's camp, but the majority prevailed and we ate together about 2 p.m.

After lunch Mr. Sheaffer provided a <u>mule</u> for Florence Boyrie and <u>directions</u> for the rest of us for reaching the old contact and Peacock mines on the east side of the valley near where we could see a dark crescent-shaped dike of basalt cutting across the white marble-capped ridge. We started out at a lively pace but soon found ourselves puffing along behind the mule with frequent stops for wheezing and observation of the topography, stratigraphy and flora. The glacial character of the topography was easy to see. At the head of the valley Eagle Cap was conspicuous, looking somewhat like Half Dome in Yesemite. A bare streak down the mountainside and across the valley showed where an avalanche had snapped off the trees and stopped on the far side of the valley.

The trail was covered with talus in many places and overgrown with brush so the going was hard but we finally made the tumbled-down shacks of the old mine about 5 P.M., tired and thirsty. Cold water running from the old mine tunnel soon refreshed us so we cracked rocks and pawed over the dump hunting for specimens to prove we'd been there. We found good pieces of chalcopyrite and what appeared to be pyrrhotite as well as some molybdenite. The tunnel was driven along the contact between the granodiorite intrusion and the overlying marble. Farther up the slope another cut had been made along the contact between the basalt intrusion and the marble. Sulfides occurred here also and a few cinnamon colored garnets, perhaps essonite, were found.

Realizing that we would be late most of the party started back behind the mule (which showed he had a mind of his own when it came to choosing the trail) leaving Mrs. Boyrie, Schminky and Jones to do the exploring at the higher cut.

As usual, the return trail was shorter than the up trail in spite of our load of specimens and items forgotten by the first to return, but it was dusk when we reached the cars, several thousand feet below and, unlocked them so the girls could take refuge from those jack-rabbit sized mosquitoes which had chased us down.

It was dark when we reached the valley floor but we found Grandfather Schminky by the light of his bonfire just as he was about to abandon hope, and accept a hospitable sheepherder's invitation to spend the night.

Kindly Mrs. Williamson had supper waiting for us in spite of the late hour. She had suspected that our trip would take longer than our estimate. She has had previous experience with amateur mountain climbers.

We retired fatigued but pleased to have had a day so profitable in the study of materials, processes, structures, the interrelations of these; the inspiring views of distant mountains and valleys, and the beauty in form and color of the many varieties of flowers close by.

July 10th:

This being Sunday, no trip was scheduled for the group, but everyone was left to do as they pleased. And according to the diary "we did just that".

"Some 'shot' movies, some of the feminine members did some necessary laundry work, and some tried to keep in trim by taking a walk. Various ones amused themselves by motorboat riding, watching the activities at the dock, 'hunting' the elk, and riding horseback".

The leader used part of the day to locate the road to the black marble quarry for a future trip.

This day also saw ths welling of our ranks. Mr. and Mrs. Ray Treasher and their niece Miss Bernice Schader were the first arrivals. The evening stage brought Miss May Robertson, assistant instructor of geology at the University of California.

July 11th:

Ray Treasher had made dire threats about what would happen to the leader if the trip to Hat Point was made before Ray joined the party. So that trip was set for today. "Our party, in four cars, left camp at 7:30 a.m. for Joseph and Imnaha." Our group was increased by a car containing Miss Amarette Barnes, nature study teacher at Beaverton High School, and two companions.

The start of this trip seemed rather topsy-turvy. When viewed from Joseph, the broad valley of the Wallowa river and its tributary, Prairie creek, which have an elevation of about 4000 feet, seems to end at the base of the 5000 to 6000 foot plateau which lies between it and the Snake River. One would expect to reach the top of this plateau by ascending some stream that flows out of it into the Wallowa river. Instead, the road crosses a low divide into the canyon of Little Sheep creek and descends, to an elevation of 1900 feet at the town of Imnaha on the Imnaha river, right into the heart of this plateau. The canyon is cut entirely in Columbia river basalts. The scenery is a duplicate of that along the John Day river, where it cuts the basalts, but here it was enhanced by many green trees.

At Imnaha begins the real climb to the top of the plateau - seven miles in second gear. A viewpoint at the 5-mile post gave us our first true picture of the country we had traversed. The plateau was not a big flat plain. Deep canyons with scarcely any land between cut it everywhere. The divide between Big Sheep creek, which flows two miles to the west and parallel with the Imnaha, makes a real knife edge between the two streams.

The canyon of the Imnaha, which lay at our feet, was a sight to behold. Stretching southward, almost arrow straight, this gash in the earth's crust is as perfect a U shaped valley as one could expect to find. Ray Treasher said that any one could be forgiven for calling it a glaciated valley if they could do no more than see it from a vantage point such as ours. But his guess was that it was only the talus that had accumulated at the base of the steep walls which gave the appearance of the U-shape. He said that he had never heard of any evidence being found to show that the glacier which once occupied the upper valley of the Imnaha had ever extended this far. The Wallowa mountains furnished the proper background for this scene.

Two more miles of travel brought us to the end of the steep climb and to the top of Grizzly Ridge which is the divide between the Imnaha and Horse creek. This is another narrow ridge and the road was first along the canyon of one stream and then along that of the other, with wonderful views in either case. At Granny Point we had our last view of the Imnaha and the Wallowas. Then we swung northwards around the head of Horse Creek canyon and before we realized the change of direction, we were gazing down Saddle creek into the canyon of the Snake river and across to the Seven Devils in Idaho. Our watches told us that lunch time was past, but that did not hurry us away from this splendid view nor prevent us from pausing several more times between it and Hat Point for other glimpses of this rugged canyon.

In this stretch, the ridge began to broaden into the first semblance of a flat plateau that we had seen. At Hat Point there must be at least a mile of flattened land between the canyons. The Hat Point lookout station is at an elevation of 7000 feet and the Snake river flows some 5500 feet below it. Nearly everyone climbed to the top of the tower for the view before looking for lunches. And it is a view to make one forget mere trifles like lunch. Every point of the compass contributed its share to the panorama. To the east, the Seven Devils form the rugged background for the Snake river threading its way far below. To the north and south & in the foreground to the west is a broad flat-appearing, timbered plateau. We knew that deep canyons cut this surface, but from this viewpoint top of ridge seemed to blend with top of ridge to make a level floor. The Wallowas, and farther beyond, the Blue mountains, completed the picture to the west.

We finally rounded up the group for lunch, and after that was disposed of we gathered on the brink of the canyon to discuss geology. "How did it happen?" was the question. As we sat there gazing out over that vast empty space that separated us from the crests of the Seven Devils, this question seemed too big for our limited geological knowledge to fathom. The rock structures that were visible from our point of view gave no explanation for the origin of this 7000-foot gash in the face of old mother earth. Our side of the canyon consisted of a series of basaltic flows to the bottom of the canyon. These beds seemed to lie horizontally with the exception of one point where several beds seemed to have a decided dip to the westward, and these beds were interbedded with the horizontal flows. None of these flows seemed to exist on the Idaho side of the canyon at this point. We could not tell the kind of rock that made up the Seven Devils, but we assumed it to be similar to the granitic and the greenstone series of the Wallowas just from its erosional appearance. We did not detect any of the basalt caps that we saw in the Wallowas. Far off to the north and to the northeast we could see some basalt flows that rose as they neared their southern end, and which we could easily picture as once having extended over the crests of the Seven Devils. If the basalts on which we sat ever joined this covering, they must have made a very sharp rise over the area now eroded away by the Snake river.

With this visible structure before us, we tried to see the picture of the formation of the canyon. Dr. Hodge told us, in one of the University extension classes, that the two mountain ranges had been uplifted about the same time, with a saddle between them. North and south flowing streams developed on this saddle, and began cutting canyons. Finally the heads of two of these streams met to form a low pass. About this time, Lake Bonneville (Salt Lake) found an outlet to the north and poured its waters into the great central basin into which our southflowing streams had been sending their waters. The water rose in this basin until it spilled through the pass between the Wallowa mountains and the Seven Devils. The supply of water was great enough to change the pass into the canyon that now ranks as the deepest in the world. But this picture covers such a vast area, that we could hardly fit it in with the one we were looking at.

Many of our questions had to go unanswered. We still wonder why the basalts end so abruptly on the Oregon side of the canyon. Some of us are wondering if a fault did not play a big part in starting the canyon. But we all agree that the sight that the Snake river makes as it winds like a thread along the bottom of this mighty chasm, was ample pay for the trip. As on our other trips, the return to camp was a leisurely one. The afternoon sun made different scenes out of many of our morning stops. And the beds of lupine, larkspur and pentstemon were as showy as ever as they spread out among the pines.

July 12:

This should be a red letter day in the annals of the geological society, for it marks the first trip conducted on horseback. We were sorry that we had to bid farewell to the Treasher group before this adventure began, but Ray had to join Dr. Warren D. Smith at the State Department of Geology and Mineral Industries camp on the Lostine. He invited us to spend the coming Thursday with that group, before we parted.

Our trip for the day was a visit to Aneroid Lake. "It was a memorable day because we rode 13 miles by horseback, and most of us hated to say how long it had been since we had ridden. For one of the group, it was her first experience, and she was a "brick" about it! We left camp about 8:00 a.m. up a steep winding trail - 12 in the party and a guide. The canyon and mountains were beautiful, and we were a merry group."

The steep winding part of the trail came in the climb from the canyon of the main river to the almost hanging valley of the East Fork of the Wallowa river. The views back became more spectacular as we gained elevation. Somewhere on this climb we passed out of the greenstone into the shales and then into the granitoid rocks.

This upper valley was truly U shaped. We passed many rounded masses of granodiorite rising from the valley floor. The sides of the canyon were of granodiorite, overlain by marble. Some of the easterly points were capped with basalt. Dark dikes cut the westerly wall.

"There was an early lunch in a mountain meadow carpeted with buttercups, violets and birdbills. Red heather grew in the rocks." A low mound cutting the valley at right angles at the foot of this meadow told us that we were in the remains of a moraine lake.

It was but a short ride from out lunch stop to our destination - Aneroid Lake, the jewel of the valley, at an elevation of 7550 feet. "The lake, set in the mountains, with trees and snow around it, was a lovely sight." It took away all thoughts of the trail from tenderfoot riders. Lying in the cirque of the glacier that once descended the valley, it is surrounded on three sides by towering rock walls of granodiorite and marble. We knew that some prospecting had been done in this region, so we headed to the camp of "Silvertip" Seeber for information about the mines.

"Silvertip, lord of the lake, is a character to be remembered, if one does not take him too seriously." Some forty years ago he came to the lake to spend the last few years of his life. But the tonic air of the Wallowas made liars of the prognasticators of his end. During these years in his life he has acquired much real and some manufactured information about the Wallowa country. He very kindly pointed out a small spot of ground that stood out in the center of the snow bank that still filled the south wall of the cirque, and told us that it was the only part of the mine dump that was to be seen until more of the snow was gone. So we headed for that spot on the snowfield.

The dump yielded garnet, chalcopyrite, and molybdenite. We were sorry that the tunnel was buried under the snow. Some of the party had climbed to the exposed rock above the snowbank and they called down that garnets were to be found there also. That set the whole group clambering laboriously up the steep talus slope. The talus seemed to be mostly marble from the upper wall of the valley. There was considerable garnet in some of the pieces, and weathering had etched the marble away from the crystals. We reached the top of the talus and the base of the cliff at an elevation of 8000 feet according to the barometer. Here we found a dike of dark rock cutting the marble and found more of the garnet in larger crystals. One of the ladies in the party gained the title of "faceted lady" after an unplanned descent down the slope we had climbed. On our return to the valley floor, Silvertip pointed out an area where the garnet was almost a solid mass like a vein in the rock. We did not succeed in securing any whole crystals from this area.

By now good judgment told us that it was time to head for camp. We found that our guide had left with three of our group, leaving the rest of us to fare for ourselves. Dr. Jones' horse had lost a pick from his pack at our lunch stop, but it was not discovered until we arrived at the lake. As the pick was one that originally belonged to Dr. Condon, we did not like to see Francis lose it, so when we arrived at the meadow the whole group spread out to search for it. It seemed like hunting for the needle in the haystack, for the horses had wandered over much of the area while we were eating. But Mrs. Boyrie was the sharp-eyed one that spotted it after we had covered about half of the ground.

(To be continued)

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
704 Lewis Bldg., Portland, Oregon
POSTMASTER: Return Postage Guaranteed

PORTLAND
1
OREG.

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon

Geological News Letter

Vol. 4 No. 24 Portland Oregon Dec. 25 1938

Official Publication
of the

GEOLOGICAL SOCIETY
OREGON COUNTRY

THE GEOLOGICAL NEWS LETTER

Official Bulletin
of the

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Portland, Oregon

Bulletins issued semi-monthly on the 10th and 25th.

Yearly Subscription $2.00

All material for publication in the News Letter should be sent to the Editor. Address all other correspondence regarding the News Letter and changes of address to the Business Manager.

This publication is prepared by the Multigraph-Duplicator process.

* * * * * * * * * * * * * * * *ANNOUNCEMENTS* * * * * * * * * * * * * * * * * * *

Lectures

Friday Jan 13 : Doctor Ira S. Allison, Professor of Geology, Oregon State College, will discuss some phase of the glacial drainage problem of the Columbia Plateau. Dr. Allison has specialized in a study of the effects of Pleistocene glaciation in northeastern Washington and in western Oregon and always has something of great interest to members of the Society.

Friday Jan. 27 : Mr. Kenneth N. Phillips will "vacation" for us. The Phillips family had a most interesting vacation trip this past summer and Mr. Phillips has an unusually fine set of color slides that were taken at that time. He will show his slides and describe the various features that they visited. Mr. Phillips has lectured to the Society a number of times and his talks are always interesting, full of fun, and valuable information.

Field Trips

Sunday Jan. 15 : Mr. Earl K. Nixon, Director of the State Department of Geology & Mineral Industries, will lead a group into Columbia County for a review of the Columbia County iron ore situation. This subject is of particular importance in recent years in connection with its possible use with Bonneville power. Mr. Nixon is well qualified to lead such a trip, and this date should be saved by all Society members.

News-Letter Index

The index for Volume 4 of the Geological News-Letter has been prepared by Miss Ruth Hickman and will be available, shortly, to those who wish to have it included when their News-Letters are bound. Advise Mr. Raymond L. Baldwin, 345 U.S. Courthouse, Portland, that you will want an index bound with your volume when it is to be sent to the bindery. This is essential in order that the proper number may be prepared.

The index will be mailed to Society members just as soon as there is space in a News-Letter for it.

Service Committee

Bulletins for the following members have been received:

Dr. Bahrs	$6.60	R. W. Brandt	$3.00
E. A. Boyrie	$1.00	E. Catlin	$2.20
M. Bowie	$0.25	L. Oberson	$1.00
H. Brady	$1.20	M. Smith	$1.25

Please call Mr. Wade and make arrangements for securing these bulletins.

(signed) Tracy Wade, 4204 N.E.Broadway, TR 6060

New Members

Mr. Everett E. Williams, 1332 N.E. Weidler St., TR 3812

NOMINATION AND ELECTION OF OFFICERS

The By-Laws of our Society read as follows: "A nominating committee -- shall report -- before the 15th day of December, prior to the time of the annual meeting of the Society - the name of one nominee for each office to be balloted on. On or before the first day of January of each year, -- shall notify the members -- by publication in the official publication of the Society. --- Other nominations may be made by members of the Society, by filing with the Secretary on or before the 15th day of January of each year, a list of such nominations, which shall be signed by at least 10 members of the Society. The names of the additional nominees shall be communicated by the Secretary to each member, -- by publication in the official publication of the Society, which communication shall be made not less than fifteen days prior to the annual meeting."

"A letter ballot containing the nominees of the regular and special tickets shall be enclosed and mailed to each member. All ballots must be returned and in the hands of the Secretary prior to the annual meeting at which meeting the Secretary shall announce the result thereof. In case a majority of all the ballots shall not have been cast for any candidate for any office, the Society shall proceed to make an election, in open meeting, for such office from the two candidates having the highest number of votes."

The annual meeting of the Geological Society of the Oregon Country will be held in the Public Service Auditorium, the 4th Friday in February, Feb. 24th, 8:15 p.m Please note that this is not the annual banquet.

REPORT OF THE NOMINATING COMMITTEE

The nominating committee for the Geological Society of the Oregon Country submits the following names for officers and directors for the fiscal year 1939-1940.

President	Arthur M. Piper
Vice-Pres.	Harold B. Schminky
Secretary	Ruth E. Hickman
Treasurer	H. Mildred Stockwell
Directors	Edwin T. Hodge
	Carl P. Richards

Respectfully submitted:

Dr. C. L. Booth, chairman
Franklin Davis
Mrs. Dwight Henderson
Miss Rose Jennings
Leo Simon

News of the Members

Wedding invitations have been received by Society members, announcing the marriage of Miss Viola May Lagasse to Mr. Louis Edward Oberson, on Sunday evening, December 18th. Congratulations are extended to the couple by the Geological Society of the Oregon Country, with sincere wishes for the best that life may have in store. Mr. Oberson has been very active in the Society, and will be remembered for his generous contributions to our knowledge of the zoology specimens collected on the trips.

* * * * * *

Mr. E. ~~H.~~ Rockwell has an article in the December 1938 issue of Hobbies entitled "Quartz Minerals in Oregon" with 4 illustrations of polished specimens from Mr. Rockwell's collection. Mr. Rockwell describes some of the specimens that are found in Oregon and the localities, and has received a number of letters that express interest in Oregon material. Not only is his article well written, and interesting, but it is furthering the widespread interest in Oregon Country geology.

* * * * * *

Mr. A. M. Swartley made a trip to Spokane for the Northwest Mining Convention, Dec. 8-9-10. He presented a paper explaining the activities of the Oregon State Department of Geology and Mineral Industries.

ABSTRACTS

Abstract "A Pleistocene Damming of the Lower Columbia River", by Ray C. Treasher, to be delivered at the Northwest Scientific Association meeting in Spokane, Dec. 28-29, 1938. Glacial erratics found to an elevation of 400 feet in the Willamette Valley, Oregon, indicate that there was a Pleistocene damming of the lower Columbia River. This dam produced the lake in which the iceberg-rafted erratics were floated. An ice-jam in the lower Columbia River has been proposed as a means of forming this lake. This may be the answer to how the lake was formed but as evidence is incomplete, an alternative possibility is suggested. This alternate hypothesis suggests that the Columbia River did not discharge to the Pacific Ocean across the Coast Range between Oregon and Washington, but flowed northward from Longview-Kelso through the Cowlitz Valley, across the Napavine Divide, and into Puget Sound near Olympia. Continental ice then dammed the outlet of these waters from Puget Sound to the Pacific Ocean, and the Columbia River drainage was ponded to form Lake Columbia. After Lake Columbia had attained a surface elevation of at least 500 feet, the lake waters spilled over the Coast Range near Clatsop Crest and drained the Lake. Lake Columbia was the lake in which the icebergs floated. Peculiar drainage patterns in the Chehalis, Washington, quadrangle, a 500 foot terrace floored with a deeply weathered gravel, and the fact that the Napavine Divide is not covered by a "deep residual soil" are points considered in support of the hypothesis. This hypothesis is presented, not as a final, definite answer to the question of how the Lake was formed, but as an idea worthy of consideration as the problem is in the course of solution.

* * * * * *

THE G. S. O. C. SUMMER CAMP AT WALLOWA LAKE
July 4th to 16th, 1938.

H. B. Schminky, leader.

(continued)

We thought that our adventures were over for the day. But two of the party lost their mounts when we stopped for a drink. There was a trying chase before they were recovered.

A pair of elk greeted us as we neared camp.

We found that one J. Martin Weber had moved in and set up camp next to the Boyries while we had been away. His was a camp with all the comforts of home.

July 13:

We all expected to suffer from riders' cramp today, so we had planned only a short trip to the black marble quarry to give us a chance to recover from our ride. Much to the joy of all, we found that we could still move our limbs, and what was more to the point, we could sit down to our meals as well. We did not change our trip, but set out about 9:00 A.M. for the quarry. We drove out from Enterprise over a fairly good farm road to a point that was supposed to be about a mile from the quarry. "It was our only hot day and we felt it when we left the cars about 10:30 and started to hike up the mountain. What was supposed to be about a mile proved to be much farther, so we did some grumbling before we reached the old lime kiln". The kiln was the first one used to convert the marble into quicklime. Later there were some new kilns built at a lower elevation that could be reached in the winter and early spring. The present plant is located in Enterprise.

The kiln was about a mile from our cars, and we found that we had another long mile to go to the quarry. A cold mountain stream furnished us the energy to make the final grade. In this walk we saw much evidence of basalts on the ridge above us. The old road, which had been built to bring out the marble, seemed to be constructed in the talus from this ridge, so we could not tell what lay under the basalt.

The marble quarry did not make a very striking appearance. All the buildings are in a poor state of repair, the face of the quarry is badly shattered from blasting, and to top things off, the winter snows had started an avalanche, which brought much debris down from the mountain above into the workings. But we were interested in the marble and in what it contained, so "the search for fossils began. Hunting for fossil coral proved so intriguing that it was 3:00 p.m. when we got back to the cars and lunch. But - we had found some good specimens".

"When we returned to Wallowa lake some of the party enjoyed a swim. They said the water was warm ??? "

"After dinner we were so interested in talking over plans for tomorrow that we missed the most of a brilliant sunset."

July 14:

Mrs. Boyrie, Mrs. Weber, Florence Boyrie, Miss Robertson, and Dr. Jones drove again to Lostine and up the valley which we had visited the previous Saturday. This time we did not stop until we met Mrs. Treasher on the way out. Miss Robertson transferred to Treasher's car to return to Portland, but no sooner were they out of sight than someone in the Boyrie car noticed a package of lunch which had been prepared for Miss Robertson. We turned around as quickly as possible on the narrow road but the delay gave Mrs. Treasher quite a lead so the chase lasted several miles over roads that made us feel like we'd had a ride on a roller coaster before our raucous horn tooting brought our quarry to a stop. We hastily proffered the forgotten lunch, only to be spurned, for the lunch that we had hastened to deliver was Dr. Jones's! Were we chagrined!

In spite of the delay we arrived before noon at the camp of the Oregon bureau of Geology and Mineral Industries, where Dr. Warren D. Smith awaited us. Florence Boyrie elected to stay at Sheaffer's camp and ride a horse, but the rest of us wasted no time starting our hike up to Chimney Lake with Dr. Smith.

After crossing the turbulent river on a precarious footlog we started up the steep trail with the sun hot on our backs. A snowslide had removed the vegetation along the first part of the trail and the high humidity added discomfort, but we eventually reached the shade of heavy woods where we rested and quenched our thirst at an ice cold brook.

As we ascended the mountain the glacial topography became more apparent. Erratics were plentiful but mostly consisted of granodiorite with varying proportions of the three main constituents, quartz, feldspar and hornblende. Where the bed rock had been exposed small aplite dikes were frequently seen; quite large crystals of feldspar were found in some of them.

About noon we reached the upper bench where the roaring stream we had been following suddenly became a quiet meandering brook in the old hanging valley of an alpine glacier. Thunder had been heard for some time and heavy drops were soon spotting the polished rocks at our feet so we took refuge on the lee side of a rock wall which we ate our lunch.

The main portion of the storm passed us by so with clothing dampened but not our spirits we continued up the trail, not so steep now, to Chimney Lake. Everywhere could be seen the action of the glacier, rounding off the bedrock, gouging, scratching and plucking it. The effect of structure in determining the course of a stream was well illustrated at the outlet of Chimney Lake, where a V shaped cut in the granodiorite followed the joint planes of the mass.

A great dike of basalt could be seen cutting across the small, steep-sided cirque bowl of the lake. Considerable snow still bordered the edges and both red and white heather together with a pink dwarf mountain laurel (kalmia) carpeted the marshy patches along the shore and in the valley.

After exploring a bit, collecting specimens and taking pictures, we started back, discussing the nature of the rocks, the processes which accounted for the topography, and the general geology of the region, with Dr.Smith as we went.

The return trip was made with few stops since the storm had brought us cool comfort. Grand panoramas of the Lostine valley and the higher peaks beyond opened out for us at almost every turn. Some evidence of faulting along the Lostine valley could be seen in the structures across the valley from us wheere the formations did not seem to conform to those on our side. In a few places the trail crossed dikes of basaltic material which it has been suggested may be roof pendants in the intrusive granodiorite, but this seems unlikely, at least in this case, since the overlying antecedent racks are marble.

The many kinds of flowers, shrubs and trees interested us but they were too numerous to detail here.

When we reached camp we found that the scouting parties had returned and were preparing supper, so we impatiently awaited the arrival of Mr. Schminky and the girls who had our food with them. Before long they drove in from up the river where they had gone upon arriving late in the afternoon. We spent little time examining each others' specimens, for the inner man insisted on being appeased.

Not satisfied with the brecciated, folios conglomerate which Mr. Weber prepared in his frying pan, the rest of us embellished it with pieces of cheese, etc., while he was absent heating some soup. The finished product was a masterpiece of geologistic art.

Around the campfire after supper Dr. Smith, Ray Treasher, Mr. Aller, and the rest of us spent an enjoyable hour discussing the geology of the Wallowa mountains and many other subjects before we had to wend our way back to the lake.

July 15:

The Schminkys had to return to Portland today. Francis Jones and Martin Webber aided in the packing of "trophies".

"The remaining feminine members of the camp, five of us, with a guide, braved the trail to Ice Lake on horseback. It is a more interesting and spectacular trail than that to Aneroid Lake We amused ourselves by pointing out the fine dikes, etc We had marvelous views of the higher peaks and the turbulent tumbling West Fork of the Wallowa river. The falls are surprisingly beautiful and the lake is a little gem. We ate on a tiny point beside the lake and then began the usual hunt for 'contacts', and alpine plants. Mrs. Boyrie got up to the contact first and began picking. There was only one pick, but Mrs. Boyrie generously allowed us to try our hand. Garnets were in abundance and we got some specimens".

"On the way down we attempted to locate one of the old mines found it but could not find a trail. By that time thunder was rumbling all around us so we voted against leaving our horses and climbing to the mine, fearing that we would be too late returning. We did regret that we couldn't carry back the desired specimens."

July 16:

"The Rosa, Smith and Fowler members of the group left Wallowa lake with regrets."

July 17:

"Mrs. Boyrie and Florence and Dr. Jones broke camp, leaving Martin Weber as the only G.S.O.C. at Wallowa Lake".

Martin spent several days following the breakup of our camp with the mineral survey party.

CONCLUSION.

Our experiences prove that it is possible for a group of our members to spend their vacations in the study of geology. We did not attempt to upset the findings of competent geologists who had studied the region before us. We simply tried to see the things that they saw and described, and we tried to see how they arrived at their conclusions. We found that we did not need a driver to force us out into this scenic country, and that our enjoyment of the scenic beauties was really given a touch of spice by our inquiry into the geologic background.

I, as leader of the trip, feel well repaid for the time put into planning it. I close with these final words from the diary: "We didn't waste a minute everybody was congenial, and we left with a host of pleasant memories to last us until next year, when we hope G. S. O. C. will have another summer camp".

H. B. S.

* * * * * *

HOW HIGH IS IT?

-o-

Facts of Interest Regarding Elevation in Wallowa County and Forest

-o-

(All general figures are close estimations
from best available topographic maps)

--o--

Peaks over 8000 feet in elevation.

Sacajawea	10033	Middle Mountain	9500	Ruby Peak	8700
Matterhorn	10004	Flagstaff Peak	9450	Hazel Mountain	8500
East Peaks	9700	Cusick Mountain	9400	Katy Mountain	8300
Eagle Cap	9675	Glacier Mountain	9300	Signal Peak	8200
Twin Peaks	9650	Elkhorn Peak	9300	Minam Peak	8000
Aneroid Point	9600	Peak 1½ mi. SW.			
Sturgill Peak	9600	of Blue Lake	9300		
Sawtooth Peak	9500	Peak just south	9300	Peaks below 8000 foot	
South peak on		of Francis Lake	9300	on Bear Cr. Drainage	
Hurricane Div.	9500	Brown Mountain	9000	Bald Mountain	7911

Sentinel Peak	9500	Marble Mountain	8800	Goat Mountain	7800
Point Joseph	9500	Lookout Mtn	8800	Huckleberry Mtn.	7700

--0--

Elevation of most of the lakes in Wallowa Mountains.

Cliff Lake	8400	Cheval Lake	7800	Moccasin Lake	7500
Prospect Lake	8400	Rogers Lake	7800	Douglas Lake	7400
Glacier Lake	8300	Mirror Lake	7700	Minam Lake	7300
Billy Jones Lk.	8300	Unit Lake	7700	Horseshoe Lake	7200
Jewett Lake	8200	Lee Lake	7700	Little Storm Lk.	7200
Pocket Lake	8200	Green Lake	7600	Ice Lake	7100
Chimney Lake	8200	Hobo Lake	7600	Frazier Lake	7100
Dollar Lake	8100	Aneroid Lake	7550	Steamboat Lake	7000
Francis Lake	8000	Wood Lake	7500	Long Lake	6800
Swamp Lake	8000	John Henry Lk.	7500	Deadhorse Lake	5700
Upper Lake	7900	Crescent Lake	7500	Wallowa Lake	4411
Bear Lake	7800	Little Francis	7500		

--0--

Elevation of Stream Headwaters and Junction with Other Streams

Stream	Headwaters	Mouth or Junction
Wallowa Riv.	Glacier Lake (8300')	Grande Ronde (2313')
Imnaha Riv.	Crater Lake on Whitman N.F. (7500')	Snake River (1100')
Minam Riv.	Blue Lake (7700')	Wallowa River (2537')
Lostine Riv.	Minam Lake (7300')	Wallowa Riv. (approx. 3300')
Bear Creek	Bear Lake (7800')	Wallowa Riv. (2941')
Big Sheep Cr.	Dollar Lake (8100')	Imnaha Riv. (2000')

--0--

Elevation of Forest Lookouts, State and National Forests.

Huckleberry	7450	Nesbit Butte	6200	Kirkland	5250
Nebo	7400	Mormon	6150	Red Hill	5100
Stanley	7350	Marl Butte	5900	Woods Butte	4200
Hat Point	7000	McGraw	5500	Akers Butte (State)	4515
Lookout Mtn	6400	Elk Mountain	5400		

--0--

Elevation of Towns in Wallowa County

Enterprise	3750	Wallowa	2941	Lostine	3362
Minam	2537	Rondowa	2310	Joseph	4190
Imnaha	2000				

Abstract: "Structures in the West Coast Chromite Deposits" by John Eliot Allen delivered before the Oregon section of the A.I.M.E., on Dec. 7th, 1938.

Mr. Allen, who was field geologist for the Rustless Mining Corporation for three years assigned to studying chromite occurrences in the west, described ten characteristic deposits in California and Oregon which exhibit features leading to a theory of origin. These features are: 1. Alignment of the chromite bodies within and along crush or shear zones in the peridotite or serpentine. Even when the rock is not highly sheared, veinlets of magnesite and tremolite indicate the zones. 2. Arrangement of the ore-bodies in these zones with respect to the zone and to each other. The lenticular bodies may lie parallel to or at right angles to the zone, but they most commonly lie at an angle to it, in a staggered or en echelon fashion, sometimes almost overlapping. 3. Occurrence of ore of different grades within adjacent bands in the ore body. In no case was the ore seen to grade out into the surrounding rock. However, an apparent grading sometimes appears when bands of ore have decreasing tenor from the center outwards. 4. The zones including the ore bodies are arranged in definite geometric patterns with textures ranging from a few hundred yards to over a mile. These patterns usually form parallelograms with more or less equal sides and acute angles over sixty degrees. They are sometimes rectangular. The largest chromite bodies are found at the intersections of the zones. 5. When the stresses which affected the region during the time of the peridotite intrusions are known from other evidence, these patterns conform to the strain ellipsoid.

A suggested theory to account for these features incorporated the following points:

1. Segregation of a chromite rich magma may commence at depth during or before the intrusion of the peridotite, and certainly continued for a while after its intrusion

2. Serpentinization of the peridotites, now generally thought to accompany or occur soon after intrusion, set up stresses which deformed the intrusive body with the major stress normal to the contacts. Along lines of weakness within the peridotite, movement took place and the chromite-rich magma from below was intruded into openings which may be described as gash-joints. The intrusion of the ore may have occurred in a series of pulsations, each successive one being slightly richer in chromite.

NEW TOPOGRAPHICAL TERMS AND GEOGRAPHICAL NAMES.

Members of the Society who follow the published decisions of the United States Board on Geographical Names will have noted that in their latest bulletin, covering decisions for the year ending June 30, 1938, certain new topographic terms dealing with submarine features are given official approval. It is believed that these terms will be used more and more as more oceanographic data become available.

1. Seamount: "The generic term 'seamount' is here used for the first time, and is applied to submarine elevations of mountain form whose character and depth are such that the existing terms bank, shoal, pinnacle, etc are not appropriate". Examples: Davidson Seamount, 75 miles west of Point Piedras Blancas, Calif., Pioneer Seamount, 50 miles southwest of the Golden Gate, rising from a depth of 1,600 fathoms to within 421 fathoms below sea level; etc.
2. Seavalley: "The generic term 'seavalley', here used for the first time, is applied to submarine depressions that are of valley form without the steepness of wall of those that are called canyons".
   Examples: Pioneer Seavalley, off the coast of California, centering near lat 37° 17' N., long. 123° 15' W.

Several submarine canyons have been officially named by the Board. The best known (to Society members) is the one west of Astoria, which is named ASTORIA CANYON, and described thus: "a submarine canyon about 15 miles west of the mouth of the Columbia River near lat 46° 15' N., long. 124° 30' W., Pacific Ocean. It extends 17 miles westerly from its head at the 100-fathom curve, thence southwesterly into the ocean depths". Other canyons named include HYDROGRAPHER CANYON, off Georges Bank, 15 miles long, 100 fathoms to 1,000 fathoms depth, LA JOLLA CANYON about 5 miles long, heading in a bight north of Point La Jolla, Calif., MENDOCINO CANYON, heading 2 miles offshore near Cape Mendocino, Calif.

Other names of interest to Society members include the following:

"Glisan Glacier: a small glacier on the northwest slope of Mount Hood, between Sandy and Ladd Glaciers, approximate lat 45°23'30" N., long. 121°43' W., Mount Hood National Forest, Hood River County, Oreg. Named in honor of the late Rodney L. Glisan (died May 6, 1934) of Portland".
"Langille Glacier: a glacier on the north slope of Mt. Hood, west of Langille Crags, approximately lat. 45°23'30"N., long. 121°41' W., Mt. Hood National Forest, Hood River County, Oreg. Named in honor of the Langille family, early settlers of Hood River Valley."
"Recession Lakes: two small lakes on the north slope of Mount Hood, approximately lat. 45°23'30" N., long. 121°41' W., Mount Hood National Forest, Hood River County, Oreg. So named because the recession of Langille Glacier has caused these lakes to form behind morainal deposits."

The features on Mt. Hood were given names suggested by the Research Committee of the Mazamas, several members of which are also members of the Society.

KNP.

IMPORTANT NOTICE

NEWS -- LETTER

Change of Address: Beginning January 1st, it will be necessary to submit notice of change of address one month prior to the date of change. In other words, the change of address will take effect one month following the date of receipt by the Editor. This ruling is necessitated as the mailing list is made up in advance, the Editor and other members of the staff give their time, gratis, to the News-Letter, and it is not fair to penalize them unnecessarily for the lack of foresight of members in promptly submitting their change of address.

The News-Letter will not be responsible for copies of the News-Letter which are not received by members who failed to submit their change of address, or for copies not received during the one month period required for the change. Should members desire any of these copies in order to complete their files, they may be secured from the Editor on receipt of the 15¢-per-issue price of the News Letter.

Editorial Personnel: Beginning January 1st, Mr. Raymond L. Baldwin will act as Editor-in-chief, and Business Manager, of the News-Letter. He will be assisted by several associate editors and typists. The plates for the News Letter, and the printing of the pages will be handled by the State Department of Geology & Mineral Industries on the Multigraph-Duplicator owned by the Society.

Notices for Publication: The chairmen of various committees will be responsible for getting their notices to Mr. Baldwin in time for publication. The dead-line for these notices will be the first and third Fridays of each month. This rule must be rigidly enforced, in order that the News-Letter may go to press and be released on time. All manuscripts for publication will be submitted to Mr. Baldwin.

NORTHWEST SCIENTIFIC ASSOCIATION

The Northwest Scientific Association will hold its fifteenth annual meeting at the Davenport Hotel in Spokane, December 28-29, 1938. The section on Geology-Geography announces the following program:

W. A. G. Bennett, Washington Division of Geology, Pullman, Wash., chairman.
Thomas H. Hite, U. S. Soil Conservation Service, Moscow, Idaho, Secretary.

Wednesday, Dec 28, 2:00 p.m.

1. "Interpretation of effect of faults on veins", J. H. Eby, Spokane, 15 min.; 15 min. for discussion. 2:00-2:30.
2. "A Pleistocene damming of the lower Columbia River", Ray C. Treasher, Oregon State Dept. Geology & Mineral Industries, Portland. $\frac{1}{2}$-1 hr. 2:30-3:30.
3. "Notes on the geology and paleontology of the Ginkgo Petrified Forest", George F. Beck, Central Wash. College of Education, Ellensburg, 20-30 min. 3:30-4:00.
4. "Structural conditions in the Palouse 'Formation'", Thomas H. Hite, U. S. Soil Conservation Service, Moscow, Idaho. 15 min. 4:00-4:20.
5. "Gangue Minerals of the Twin Sisters chromite ores", W.A.G.Bennett, Wash. Division of Geology, Pullman, 10 minutes.

Thursday, Dec 29, 10:00 a.m.

1. "Fairy tale from Glacial times", W. A. Rockie, Soil Conservation Service, Spokane, 10 min. 10:00-10:15.
2. "Criteria of changes of level along the Olympic coast", Ewart Baldwin, State College of Washington, Pullman. 10 min. 10:15-10:30.
3. "Clay resources of Latah County, Idaho", Vernon E. Scheid, University of Idaho, Moscow. 10 min. 10:30-10:45.
4. "Critical examination of some correlations of the Pacific Northwest", R. L. Lupher, State College of Washington, Pullman. 15 min. 10:45-11:05.
5. "Nepheline-bearing rocks north of Nighthawk, Washington", Charles D. Campbell, State College of Washington, Pullman. 15 min. 11:05-11:25.
6. "Petrology of the igneous rocks in Kootenai County, Idaho", Alfred L. Anderson, University of Idaho, Moscow. 15 min. 11:25-11:45.

Thursday, Dec. 29, 2:00 p.m.

1. Election of officers. 2:00-2:15.
2. Round-table discussion (topic to be announced) 2:15-2:45.
3. "Distribution and structural relations of the rocks in Kootenai County, Idaho", Alfred L. Anderson, University of Idaho, Moscow. 15 min. 2:45-3:05.
4. "Electrochemical and metallurgical minerals of the Northwest", E. T. Hodge, Oregon State College, Corvallis. 30 min. 3:05-3:40.
5. "An occurrence of beach type dunes south of Umatilla, Oregon", John P. Thomson, Soil Conservation Service, Spokane, Lantern.

GEOLOGICAL NEWS-LETTER
Official Publication of the
Geological Society of the Oregon Country
329 S. W. Oak Street, Portland, Oregon
POSTMASTER: Return Postage Guaranteed

PORTLAND 2 OREG

Dr & Mrs Arthur C Jones
3300 SW Heather Lane
Portland Oregon