Library

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GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

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1958 - 1959

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Society Objectives

To provide facilities for members of the Society to study geology, particularly the geology of the Oregon Country; the establishment and maintenance of a library and museum of geological works, maps, and specimens; the encouragement of geological study among amateurs; the support and promotion of geologic investigation in the Oregon Country; the designation, preservation, and interpretation of important geological features of the Oregon Country; the development of the mental capacities of its members in the study of geology; and the promotion of better acquaintance and closer association among those engaged in the above objectives.

Persons desiring to become members should contact the Membership Chairman, Mrs. William F. Clark, 3613 S.E. 9th Avenue, Zone 2, Phone: BE4-7096. Regular annual dues (single or family memberships) are $5 for residents of Multnomah and adjacent counties $2.50 for others; and $2 for Junior Members Make remittances payable to the GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Society Activities
(See "Calendar of the Month")

Evening Meetings: Formal lectures or informal round-table discussions on geological subjects, on the second and fourth Fridays of each month at Public Library Hall, S.W. 10th Avenue and Yamhill.

Field Trips: Usually one field trip is scheduled for each month.

Library Night: Once a month. Lewis and Clark College.

Luncheons: Informal luncheons, with geological motif, each Thursday noon in Room B, Chamber of Commerce Building, S.W. 5th Ave. and Taylor St $1.00 per plate.

Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon at Portland Chamber of Commerce, 824 S.W. Fifth Avenue, second floor. One dollar. You are welcome.

Friday January 9 — Lecture. "Recent Quest for the Blue Bucket Mine". Speaker is Lancaster Pollard, a writer for The Oregonian, accompanied by Wm. Lambert and Robert Scranton, two participants in the search. The program will include a short movie.

Tuesday January 20 — Library Night - at Lewis and Clark College.

Friday January 23 — Lecture. "Is an Ice Age Coming?" Speaker will be Bob Lynott of KOIN-TV.

JANUARY FIELD TRIP

Meet at Sylvan on Canyon Road at 1:30 p. m. Sunday, January 18th. You will find this to be an outstanding trip.

Franklin Brown.

NOMINATING COMMITTEE REPORT

"Dr. James Stauffer, President
Geological Society Oregon Country
Portland, Oregon

Your nominating committee presents the following names for the offices to be filled at the next election.

President	-Paul Howell
Vice President	-Franklin M. Brown
Secretary	-Mrs. Dolores Gregory
Treasurer	-Mrs. Jane Erickson
Director	-Dr. John Hammond - 3 yr. term
Director	-Dr. Francis Gilchrist - 1 yr. term
Editor	-J. R. Rentsch

Each of these candidates has signified a willingness to serve the Society in the capacity to which nominated.

Signed Rudolph Erickson
Albert Keen
Ray Baldwin
Robert Wilbur

Leo F. Simon, Chairman"

EXCERPTS FROM DR. EWART BALDWIN'S LETTERS TO MR. RUDOLPH ERICKSON

"Glad to hear about the leaves that you are finding down Wilhoit way.

My typist is doing my final copy of my book and I hope to get it off the first Monday of January or die in the attempt. Nearly all of my photos are in and my script is pretty well done.

I have an added reason to hurry. I just accepted a Fulbright award to the University of Dacca, Dacca, East Pakistan and leave as soon as school is out - about mid June. Naturally, I have to wind things up before I go. The family will accompany me. We should be back in a year."

BANQUET NOTICE

Now that Nominating committee has finished their work we have of late been hearing rumbling on slope of Mt. Tabor in vicinity of S. E. 55th & Belmont. These remind us that the Annual Banquet is just around the corner. The Committee is rather secretive regarding plans, but they did let slip that Mrs. Hayward Peirce is Banquet Chairman.

Leo Simon as usual will be in charge of ticket sales. Place of Banquet, Dining-room of Mt. Tabor Presbyterian church. and the date is March 13, 1959. Speaker has been selected, so mark this date on your calendar and come out and let's fellowship together.

KYANITE CHUNK DISCOVERED IN PORTLAND SUPPOSEDLY BROUGHT BY SWOLLEN RIVER

By Phil F. Brogan
(Oregonian - 12/15/58)

In the office of Dr. John Eliot Allen, professor of geology at Portland State College, is a stone with a strange story.

It is a story that concerns a flood which long ago swirled over the present site of Portland, flowed past Rocky Butte and along the course of Sullivan Gulch, raced between Kelly Butte and Mt Scott and past Milwaukie and Oswego.

That was Oregon's "great flood" of the world's age of ice.

The stone, generally found resting on Dr. Allen's desk, weighs 12 pounds. It is a fine specimen of a mineral known as kyanite. It was found many years ago in the excavation for Manning's Restaurant on SW 10th and Alder.

The mineral is not "native" of the Portland area, or, so far as known, of Oregon. How did it get there?

Student Presents Specimen

Dr. Allen, intrigued by the strange specimen brought to him by one of his students, Martin Daniels, whose father was on the construction crew that found the 12-pound chunk long ago, did a bit of research on kyanite.

He determined that kyanite, of possible commercial interest, had been found near Ennis, Mont., in the Missouri drainage east of Butte. Also, Dr. Allen learned, massive slide boulders of kyanite have been found near Revelstoke, B. C.

The Revelstoke locality is believed to be the source of the Portland specimen. But how did it get into the Portland area?

Undoubtedly, Dr. Allen believes, the crystal rock was brought in by the "great flood"--not the Noachian deluge, but one of the Pleistocene floods resulting from the sudden breaking of ice dams in the distant upstream country of the Columbia River.

State Park Marks Site

Rocks brought from Canada and deposited along the lower Columbia valley are called erratics--stones that are out of place in the Oregon valley. One of these erratics of giant size, in the Sheridan area is the site of a small state park.

Geologists believe one of the greatest of all ice-age floods was that resulting from the sudden breaking of an ice-blockade that had formed giant Lake Missoula, on Clark's Fork near the Montana-Idaho boundary. Behind that dam was impounded more than 500 cubic miles of water. Much of the huge Missoula basin was covered by that lake.

On the sides of mountains near Eddy, Mont., are boulders which indicate that Lake Missoula was drained by a river a mile wide and a thousand feet deep. Valley sides were scoured of soil as the flood raced to the sea. On reaching The Dalles, the water was still some 500 feet deep, and it was about 400 feet deep when it poured into the present Portland area.

In that flood were masses of ice. Rafted on some of the floes were rocks from distant hills. One of the rocks apparently was the 12-pound chunk of kyanite which Dr. Allen considers one of the top "bragging stones" in the Oregon country.

BIND YOUR NEWS LETTERS

We want to thank Miss Margaret Steere for compiling Index and for her suggestion that it should be bound in Dec. issue, doing away with confusion and at last minute looking for an extra index which those sending Newsletter for binding had forgotten to send. If you wish your Newsletter bound, remove staples & send copies to us soon. Price-25¢ per volume. We have a few bound volumes on hand of for-

ABSTRACT

GLACIERS AND VEGETATION IN SOUTHEASTERN ALASKA

(From AMERICAN SCIENTIST, Vol. 46, No. 2, June 1958)

By Donald B. Lawrence

The subject is actually somewhat broader than the title suggests. Records of Eliot Glacier on Mount Hood, Oregon, and the more closely observed Nigard Glacier in Norway are cited as correlative evidence of widespread changes in glaciation in the northern hemisphere in the last 2-1/2 centuries. But the bulk of the paper refers to 3 related ideas:

1. Records of change in the glaciers of the Juneau Ice Field and in the Glacier Bay region in southeastern Alaska, in part deduced from botanical studies.
2. The relation between glacier changes and solar activity.
3. The sequence of vegetation on a land surface freed from ice cover.

Juneau Ice Field glaciers reached a maximum growth about 1700 A. D. that has not been exceeded since the year 1000, and probably was not exceeded for several thousand years before that Recessions of 2 miles in the last 2-1/2 centuries are common.

The ice streams in the Glacier Bay region attained their maximum advance and thickness less than 300 years ago. Recession began in the middle of the 18th century. Since that time the ice front has receded 61 miles to the present ice cliffs of Grand Pacific and John Hopkins Glaciers, and 43 miles to the Muir-Riggs ice front. New and beautiful fiords have been opened to access by the recession. At one point in Muir Inlet the water is now over 1000 feet deep, where ice more than 4000 feet thick existed in the 18th century. Erosion of gravel outwash has exposed stumps of fossil forests of 14 different ages, the oldest being 7000 years old by radiocarbon dating. The youngest stumps, at Bartlett Cove, are less than 300 years old; but they stand at a level where trees could not grow now, some below tide level. It is inferred that the land subsided under the weight of the ice in the most recent advance, and that rebound is not yet complete.

There appears to be a strong tendency for receding glaciers (e. g., Mendenhall Glacier) to pause in their retreat and form recessional moraines at about 11-year intervals, in periods of low sun-spot number, when glacier nutrition was favorable, and to retreat steadily in less favorable periods of high sunspot number.

More study is needed to establish definitely the relation of sunspots to terrestial weather and glacier regimen. The sunspots are symptoms of great disturbances on the sun, and sunspot numbers are believed to be indices of total radiant solar energy. General glacier advance in late 17th and 18th centuries is related to a 70 year period of reduced solar activity observed from 1645 to 1715 A. D. Other writers have correlated sunspot numbers against barometric pressure at various places.

On areas in Alaska vacated by glaciers, vegetational development follows a fairly definite pattern. Mobile seeds and spores from nearby vegetated areas are carried onto the new land by the wind and by rodents, large mammals, and birds. But the raw new soil may lack the nutrients needed for plant growth. Hence the first woody plants may have sickly, yellowish leaves, and weak, prostrate stems. The feather-light seeds of Dryas arrive, borne on the lightest breeze, and soon the plants begin to form their typical prostrate mats of vegetation. Seeds of willow, cottonwood, and fireweed may be carried a long way by the wind. Those of alder, spruce, and hemlock are less mobile, except when they travel as "hitch-hikers" on some roving mammal.

Two species of plants play an important role in the cycle of revegetation. They are Drummond's Dryas and Sitka alder. Each--and especially the alder--is able to take nitrogen from the air and fix it in its root nodules in a form that greatly stimulates the growth of other plants that are lucky enough to reach it with their roots. Prostrate stems immediately begin to grow erect. The energized cottonwoods multiply and grow upward rapidly, until their high and dense canopy screens out much of the light in the understory needed so vitally by the alders. In time the alders die, and their litter helps further to fertilize the forest floor. About 5 to 50 years may be needed for woody plants to get a foothold on the new soil after the ice has gone, depending to some extent on the distance that the seed must be carried. By 170 years after ice-melt, the alders may be matured and gone, and dense stands of Sitka spruce up to 110 feet high have formed; hemlocks and other plants tolerant of shade have moved into the understory.

Mosses and litter have formed duff 6 to 12 inches deep. Sphagnum moss appears; as it spreads, the forest floor becomes more soggy, and some trees die for lack of air in the root zone. Continued growth of sphagnum moss produces "muskeg"--a peaty, saturated acid cover several feet in depth, that few conifers can endure In fact, the Pacific Coast pine is almost the only conifer whose seedling grows fast enough to keep its crown above the choking growth of sphagnum moss.

Literature is cited on all phases of the study, from folklore of the native Indians to the classic study by Tarr and Martin on the Earthquakes of Yakutat Bay in 1899, and their effects on glaciers in the region.

Dr. Lawrence has kindly sent a reprint of this paper to the Society Librarian. Those who read for pleasure and for mental stimulus will appreciate the conversational tone of much of the paper, which was prepared as a Sigma Xi National lecture. Reader interest is also augmented by the 8 drawings and 50 photographs reproduced.

K. N. P.

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A FIELD TRIP TO MOUNT RAINIER - AUGUST 16-17, 1958

On August 16-17, 1958, under the leadership of Mr. Leo Simon and Dr. Francis G. Gilchrist, the members and guests of the Geological Society of the Oregon Country made a field trip to Mt. Rainier. Owing to the very large size of this mountain, only the southern exposures of it were observed directly. These were made by stopping at the more advantageous places along the Nisqually River and Stevens Canyon Roads. The latter road was especially interesting as it was only recently opened to the general public. This road has been under construction for the past several years because of the numerous engineering difficulties encountered. Although this was the only part of the mountain examined, nevertheless, the entire volcano was discussed according to its various features. On one of those discussions, around a camp-fire, we were privileged to have Mr. John A. Tyers, Assistant Park Naturalist, for a guest speaker. In his lecture Mr. Tyers briefly reviewed the history of Mt. Rainier National Park and some of its principal purposes for us.

A preliminary stop was made at Kautz Creek where the results of a great flood by that stream were examined. While there were several aspects to them, the most conspicuous one was the killing of a conifer forest. At this elevation, under 4,000 feet in the Transition Life Zone, the trees of this forest doubtlessly were lovely, grand and noble firs along with Douglas fir and western hemlock, as well as, red and Alaska yellow cedars. Lodgepole pine probably was also present in small amounts. However, life was beginning to restore itself after this great ravage of water and glacial till consisting essentially of very coarse cobbles. That life is largely in the form of shrubbery, such as the devil's club and Oregon grape The regular stop was Paradise Park made world famous by the following flowers: avalanche lily; gentian; lupine; aster; Indian paint brush and many, many others. Leo Simon explained to us their characteristics, although the early Spring that occurred this year caused them to be past their most beautiful time of blossoming. Oddly enough, those troublesome but very entertaining black bears were also absent. Likewise, were many of the other birds and animals. The writer saw the wren, Stellar jay, camp robber and swallow. The animals were even still less evident, just the chipmunks and possibly a cony. Those interesting whistling marmots too weren't sunning themselves as usual in Paradise Valley, a pleasant open meadow surrounded by a thick stand of timber.

At successive stops Dr. Gilchrist and Leo Simon delineated the major geological features. Those delineations explained how the heavily forested Cascade Mountains became very rugged and broken in their entirety. It is primarily due to the deep dissection of the Old Cascades. Inasmuch as they are largely made up of lavas, the numerous secondary streams have cut innumerable steep-walled canyons, separated by narrow ridges, in them. In this part of central western Washington, much of that lava is composed of Keechelus andesites. There are two sequences of Keechelus andesites. The lower series consists largely of breccias and tuffs, and are considered to be of late Oligocene in age. While the upper series essentially consists of porphyritic lava, but some felsitic lava is also present. These lavas are believed to have more or less coincided in their extrusion with the Columbia River basalts, and hence, they range from early to middle Miocene in age. Along with the other lavas of the Old Cascades in this part of Washington, they were uplifted by regional diastrophism in the Pliocene Epoch. Being regional it uplifted the northern and southern portions of the Old Cascades in their

entirety as a rather high mountainous relief. Since prior to this uplifting the lavas of the Old Cascades were rather close to sea level, because vigorous erosion had worn them down almost as quickly as they were extruded. In addition to giving them their present height, this uplifting produced the uniformity of that elevation giving it the appearance of a plateau. As such, this so called plateau is from 5,000 feet to a mile high.

Another phase of this diastrophism is the intrusion of a large granodioritic batholith into this part of central western Washington. It intruded those formations which were already present here in this area. Those formations namely are the Puget Series, a group of late Eocene and early Oligocene sedimentary rocks with some intercalated volcanics underlying the lavas of the Old Cascades; and the two series of Keechelus andesites that were mentioned above. Where these formations have been removed by erosion outcroppings of this granitic rock are found. It has been correlated with the Snoqualmie granodiorite to the north, because of its overall similarity in many ways. Like most acid intrusive rocks, it is light-colored and coarsely crystalline. In certain regions a few economic minerals are also associated with its texture along the contacts with the country rock. The intrusion of it into both the Puget Series and the Keechelus andesites makes it the basement rock for this part of Washington. Since some of the younger lavas of the High Cascades rest upon these older formation and it. This is expecially true of the Mt. Rainier lavas. However, before they were extruded on them an interval of time elapsed in which considerable erosion took place. Thus, there is a great and distinct unconformity between the first three formations and the fourth.

This fourth formation, the lavas of Mt. Rainier, are found as low as both Longmire and Stevens Canyon, or 3,000 feet and in general appearance the earliest ones don't look too much different than the last ones of the upper Keechelus series. Actually the lavas of Mt. Rainier are a large series of pyroclastics and lava flows similar to those of other composite volcanic cones. Those of Mt. Rainier tower up some 9,000 feet and together with those of its immediate base, the plateau appearing Old Cascades, giving this mighty volcano a total elevation of 14,408 feet. As such, it is the highest and most distinctive volcanic peak in the United States, exclusive of Alaska. Nevertheless, it is thought it was even higher still in the past geologic epochs, but final explosions in the crater by central vents and the glaciation which followed have truncated the upper part of the cone. This beautiful mountain stands well to the western side of the axis of the Cascade Range, and some 80 miles north of the Columbia River. It and many other snow-capped peaks crowning the Cascades are in fact a narrow belt on their eastern margin, and are properly called the High Cascades. In Washington these peaks to the north are: Glacier Peak and Mt. Baker; while those to the south are: Mt. St. Helens and Mt. Adams. This great dormant volcano is not a perfectly symmetric cone, like that of Mt. St. Helens, but rather it is a huge broad-shouldered one.

Descending from these broad shoulders is the largest single glacial system in the United States, outside of Alaska. Between the radiating cleavers, these giant tongues of ice hang to a length of four to six miles. Although comparatively recent in age, geologically speaking, yet they have already succeeded in carving out large cirques and deep canyons into the sides of the mountain, which is only slightly older than they are in age. In doing so the glaciers have scoured very deep in the pyroclastics and lavas of the volcano which range from the Pliocene to early Pleistocene in age. Also in certain plac es they have gouged out the older Keechelus andesites and the sediments of the Puget Series to expose the granodiorite beneath them, the exact age of which is not definitely known. Hence, the oldest rocks exposed on the mountain are the Puget Series. They are found outcropping in the bank of the Carbon River below Carbon Glacier on the northwestern side of it. They are black well indurated argillites with alternating layers of other impurities. Outside of the National Park boundaries coal is also present among these sediments of the Puget Series. Thus, their carbonaceous character, and from which the river and glacier were named because of it. In this section of the National Park, as well as, the west side in general the Keechelus andesites have been found to be absent. It is believed that they didn't extrude into this area rather than being removed by subsequent erosion. Inasmuch as they are found on the other three sides averaging more than 1/2 mile thick. This thickness includes both the lower and upper series of them. The contact between them is not very conspicuous, but, as mentioned above, the lower one is essentially breccias and tuffs and the upper one is porphyritic and felsitic lava. These breccias and tuffs are largely indurated, and both they and the lava are somewhat altered. The degree of this alteration varies according to the

thickness of the separate masses found from place to place. Their greatest alteration is where the granodiorite has intruded into them. The texture of those has been remarkably changed often over the entire mass. One of the most interesting masses is the White River one on the northeast side. Here a swarm of xenoliths have intruded into the lavas along the contact with the intrusive rock. The granodiorite, although not so abundant as the lavas, does also outcrop in a few places. They principally are at the snouts of Nisqually, Winthrop and Emmons Glaciers. One other interesting place is the Tatoosh Range. The basal part of which is granodiorite and their upper portion is Keechelus andesites. In most places the color contrast between it and the lavas is quite noticeable.

These older formations are nevertheless in a minor proportion compared with the Mt. Rainier lavas themselves. The exact date of their first extrusion is not known. However, that it began erupting in the Pliocene has been established. The first eruptions consisted pyroclastics which were somewhat later followed by lava flows is also known. It being the pattern of eruption by composite volcanoes, and it continued intermittently throughout the Pliocene and into the early Pleistocene when this volcano finally became dormant. We say dormant, because gases still escape from fumaroles in the crater. But even during its eruptive phase there were long periods of inactivity. This is seen in the fact that there is glacial debris between some of the various lava flows. Having two crests, Point Success and Liberty Cap, it has an elongated shape. This aspect seems to suggest there may have been two vents. This also may be the reason why the lavas of Mt. Rainier are so abundant, being 1/4 of the National Park area. Like the Keechelus lavas, they are too andesitic in composition. Nevertheless, they differ somewhat mineralogically in that they are characterized by the presence of considerable hypersthene. Likewise, they are porphyritic in texture and much more columnar in structure. They also haven't suffered any alteration. This was readily seen in two grab specimens. One was taken from the younger lavas where they had intruded the older ones in the form of a dike. The other from a flow of the older lavas at a road cut along Stevens Canyon Road. With his hand lens, Leo Simon showed the writer that the specimen from the dike had no alteration of its minerals, such as the larger phenocrystic feldspar laths. They were perfectly solid with clear sharp and square corners. On the other hand, the specimen from the older lavas had definite evidences that chloritization had set in. Its feldspar laths were already zoned to a considerable degree.

Just one of the many interesting aspects of the Mt. Rainier lavas may be mentioned in a report of this kind. It is that when they have occupied the canyons of the pre-Rainier surface, they have caused the run off waters from rain, snow and melting glaciers to follow their margins and so cut new canyons, as well as, to further degrade the older unfilled canyons. This was particularly noticeable at our last official stop, the Box Canyon of the Muddy Fork of the Cowlitz River on the recently opened Stevens Canyon Road. Above the Box Canyon of the Muddy Fork the Cowlitz Glacier is melting back up the mountain. This has caused it to flow the Muddy Fork full-born, and in doing so transports a very heavy load of glacial till. This till, in turn, has already trenched the Box Canyon as we saw it. A great chasm some 600 feet deep and only 13 feet wide at the water level of the stream. In addition, the large display of polished and striated rocks was ample proof that glaciers had passed over the viewpoint area in the past geologic epochs.

(See bibliography)

T. Herbert Laurence

BIBLIOGRAPHY

1888 - White, C. A.
"Puget Group of the Washington Territory"
American Journal of Science, 3rd Series, Vol. 36, No. 21

1900 - Smith, G. O.
"Geology of Mt. Rainier"
Mazama Vol. 8 published by the Mazamas

1905 - Landes, H.
"Field Notes on Mt. Rainier"
Mazama Vol. 2, No. 4 published by the Mazamas

BIBLIOGRAPHY - (continued)

1906 - Smith, G.O. and Calkins, F. C.
"Snoqualmie Folio"
U.S. Geol. Survey, Atlas No. 139, pp. 1-14

1934 - Mattes, F.E.
"Mt. Rainier National Park Togographic Map"
U.S. Geol. Survey

1936 - Coombs, H.A.
"Geology of Mt. Rainier National Park"
Published by the University of Washington

1936 - Culver, H.E.
"Geology of Washington, Part I" Bulletin No. 32 and Map,
Division of Geology - State of Washington Dept. of Conservation and Development

1952 - Stagner, H.R.
"Behind the Scenery of Mt. Rainier National Park"
Mt. Rainier Natural History Assn.

1953 - Williams, H.
"Ancient Volcanoes of Oregon" Second Edition
Published by Oregon State System of Higher Education

FIELD TRIP TO EUGENE
Sunday, November 16, 1958

It wasn't much after eight o'clock when Trip Chairman, Franklin Brown, checked the last of the "late-comers" into the bus station and started us out to the bus, only half an hour late. But what's half an hour in geologic time?

The patches of fog at intervals along the road were not heavy enough to hide the geological features which Dr. Stauffer pointed out to the passengers, giving emphasis to the oral description with reference to large maps of the country, with cross sections showing the different rock strata and the soils. The lack of a public address system made it necessary for Dr. Stauffer to repeat his talks in order for all the passengers to hear him. People in the middle of the bus profited by the repetition.

On arriving at the Oregon State University at Eugene the group went to Condon Hall where there were tables on which we could lay out our luncheons, making them appear to be real meals.

After lunch Dr. Ewart Baldwin led the group through several rooms in which were specimens of fossils and minerals from the surrounding country, and then led the way to Dr. Shotwell's workshop where many of the fragile fossils were still encased in their plaster of Paris "shrouds" that had preserved them in shipment from the field to the museum. Here they are carefully opened and mounted for viewing.

For those of us who are somewhat sketchy in our geological lore, an exhibit of Chinese art was more thrilling. One must admire the patience and manual skill of the workers who fashioned the marvelous pieces.

Dr. Baldwin boarded the bus with the group, and from the top of Skinner Butte explained the local formations which can be seen from that height.

The ride from Eugene to Portland was marred for some by a discussion of the word rate to be paid for this account of the outing.

O. E. S.

Attention of Mr. Orrin Stanley -

Over a period of time the editorial staff has given much thought to suggestion regarding rate to be paid for articles submitted for publications in Newsletters. As you perhaps know, it has been our policy not to pay anything for such articles. The condition of our exchequer suggests that we reduce this rate. However, due to excellent way you covered our trip to Eugene, our usual rate will stand. We thank you, Orrin.

-Editorial Staff of News Letter

BOOK REVIEWS

The Library of the Society has recently been enriched by the acquisition and gift of two publications bearing on the problem of glaciation.

One of the Library additions is a copy of Harpers magazine for September 1958. This contains an article relating to the finding of two scientists, Maurice Ewing and William Donn. These men have been conducting a study for the last years as to the causes of the Pleistocene Ice Age. Their conclusion is that the cause of the waxing and waning of the last glaciation period resulted from a shifting of the lithosphere which placed the north pole over the Arctic Ocean. This area being a basin isolated from the other seas when the sea level is down, such as during maximum glaciation, and capable of receiving inflows of warmer water when glaciation is at a minimum or absent, alternately freezes over and in reverse gives off evaporation freely. Bering Sea and Straits are shallow bodies of water and also a high sill extends from Norway to Greenland. When the Arctic Ocean is free of ice and receives water freely from the Atlantic Ocean the resultant high evaporation results in heavy snowfall in the Northern Hemisphere and the winter snows are not melted during the summer periods hence the glaciers grow vastly. This glacial growth however reduces the sea level resulting in the land barrier referred to above coming into being and isolating the Arctic Ocean hence winter colds freeze the water and stop evaporation. In consequence the glaciers diminish and the sea level again rises. The authors of the theory think we shortly will embark on a time of glacial expansion but meantime may see a great increase in the height of ocean levels. The article does not state a reason for the shift of the lithosphere.

The other Library addition is received through the kindness of J. C Stevens. It is a book written and published by a friend of his, Karl A. Pauly and printed at his own expense. Mr. Pauly is a retired electrical engineer who has a great interest in geology. He became interested in glaciation and set out on a study of the subject and reached the conclusion that the theory of A. S. Eddington put forth some thirty-five years ago was the only sound explanation of the ice ages of the past, including the Pleistocene. Eddington's theory was that the various Glacial periods resulted from movements of the lithosphere. Mr. Pauly set out to prove this theory and his findings were first published in the Scientific Monthly in August 1952. His book is a restatement of his first paper with some additions to the first paper and an added part in which he set forth his belief of the cause of the shifting of the lithosphere. In Mr. Pauly's belief the shifting resulted from tidal actions on the continents and interestingly the return of the lithosphere to its original site also resulted from tidal action. Mr. Pauly also contends that mountain building in the past accompanied the ice age periods and from the same cause and concluding that the known areas of glaciation in the past reflect the position of the poles at that time Mr. Pauly has established the resultant equatorial areas. These equatorial areas so established explain present unusual locations of coal and plant leaves and of warm water sea shells, reverse magnetism, and the variation in daily time.

A reading of this book brings up many interesting questions.

R. Erickson

GEOLOGICAL NEWS LETTER

OFFICIAL PUBLICATION OF THE

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Feb. 1959 — PORTLAND, OREGON

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1958 - 1959

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Society Objectives

To provide facilities for members of the Society to study geology, particularly the geology of the Oregon Country; the establishment and maintenance of a library and museum of geological works, maps, and specimens; the encouragement of geological study among amateurs; the support and promotion of geologic investigation in the Oregon Country; the designation, preservation, and interpretation of important geological features of the Oregon Country; the development of the mental capacities of its members in the study of geology; and the promotion of better acquaintance and closer association among those engaged in the above objectives.

Persons desiring to become members should contact the Membership Chairman, Mrs. William F. Clark, 3613 S. E. 9th Avenue, Zone 2, Phone: BE4-7096. Regular annual dues (single or family memberships) are $5 for residents of Multnomah and adjacent counties $2. 50 for others; and $2 for Junior Members Make remittances payable to the GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Society Activities
(See "Calendar of the Month")

Evening Meetings: Formal lectures or informal round-table discussions on geological subjects, on the second and fourth Fridays of each month at Public Library Hall, S. W. 10th Avenue and Yamhill.

Field Trips: Usually one field trip is scheduled for each month.

Library Night: Once a month. Lewis and Clark College.

Luncheons: Informal luncheons, with geological motif, each Thursday noon in Room B, Chamber of Commerce Building, S. W. 5th Ave. and Taylor St $1. 00 per plate.

Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon at Portland Chamber of Commerce, 824 S.W. Fifth Avenue, second floor. One dollar. You are welcome.

Friday Feb. 13 — Lecture. Bob Lynott of KOIN-TV, speaker, "Is an Ice Age Coming?" Postponed from Jan. 23rd.

Friday Feb. 27 — Lecture. Dave Bohn, speaker, "Two Alaskan Expeditions"; one for the American Geographical Society of New York as part of the International Geophysical Year. Many interesting slides.

Tuesday Feb. 17 — Library Night. Lewis & Clark College - showing of crystals by Mr. Stephen Blore.

TRIP-February 15th

February 15th at 1:00 p.m., meet at S.E. 80th and Washington near Fred Meyer store. Trip leaders - Dr. Stauffer, Dr. Gilchrist and Paul Howell. Bring your binoculars. This is a combination basement and field trip.

Franklin Brown

AUDUBON SCREEN TOURS

The Audubon Society announces the following series of lectures, to be held in Cleveland High School Auditorium, Powell Blvd. and S.E. 26th Avenue:

Feb. 23	Waterway Wild Life	Leonard Hall
March 23	Great Smoky Skyland	G. Harrison Orians
April 27	East & West Hudson Bay	Dr. Arthur A Allen

Strip tickets - $2.00 Single tickets - 90 cents Students - 40 cents.

NEWS OF MEMBERS

Dr. John E. Allen spoke before the Approximate Club of the Unitarian Church on January 28 Subject of his talk "Perspectives from Earth."

The Bruce Schminky's just returned from an enjoyable bus trip to way-points in Mexico.

Mr. Cleveland Johnson is in the hospital for a check-up on his eyes. We hope by the time this goes to press, he will be well and at home.

Our efficient librarian, Mrs. Murray Miller, calls to our attention there are several books long overdue from the library. Will you please look around your place and see if you have any overdue books from the library?

Dr. Claude Adams gave a series of lectures on "Early Dentistry in Oregon" to the freshman class of the University of Oregon Dental School recently.

BANQUET NEWS

STOP! LOOK! and LISTEN! Keep the evening of March 13 open. Why? The 24th Annual Banquet of the Geological Society of the Oregon Country will be held in Social Room of Mt. Tabor Presbyterian Church, Belmont St. at 55th. Time 6:30 p.m. Price-$2.35.

Speaker-Mr. Albert Keen, "A Glimpse of the Present with a Past."

Chairman of Banquet Committee, Mrs. Hayward Peirce, assures us there will be plenty doing that evening. Anything can happen, so hold on to your hats. As usual, Mr. Leo Simon will be in charge of ticket sales. Tickets will go on sale after regular meeting January 23rd. A turkey dinner will be served, with fish for those who desire. Please telephone Mrs. Peirce Al-3-8046-so she may know how many fish dinners to order.

Come one, come all - let's make this our Best Banquet yet!

The December issue of Ore-Bin has an interesting article on Oregon's Uranium Picture with particular reference to Lakeview's White King Mine. The article is by Norman V. Peterson, Geologist, State Dept. of Geology and Mineral Industry.

BIND YOUR NEWS LETTERS. Those wishing your news letters bound, please remove the staples and see that your copies are in our hands. Price-25 cents per volume. We have a few bound volumes of News Letters available, at $2.25 per volume.

THE IDEAL MEETING

More discussion time at meetings has been set forth as an ideal recently and it's a pleasure to find that ideal being approached so soon. The occasion was the meeting of the Engineering Geology Division of the Geological Society of America, which was held in St. Louis in association with the Soil Mechanics Division of the American Society of Civil Engineers.

More time was spent at this meeting in discussion of the papers than in their presentation. Each author was given but 20 minutes to summarize the main points of his paper (the day's program started at 8:30 a.m., it may be noted). Also, preprinted copies of the papers were distributed to the audience so that points of special interest could be studied before discussion got under way. Discussion, therefore, was not taken up with questions about what was in the paper, but was focused on additional facts, ideas and viewpoints.

The result, according to those who were there, was an engineering meeting on a new technical subject--rock mechanics--that proved to be as rewarding as it was efficient.

Listening to the reading of technical papers has been called one of the engineering profession's greatest wastes of man-hours. All too seldom is there sufficient opportunity for critical discussion of the ideas presented in these papers. Engineering societies need more working conferences at which all in attendance are invited--and given time--to participate. The engineering geologists appear to have achieved this goal. Their example is worthy of emulation.

Engineering News-Record, Nov. 27, 1958

- - METEOR SHOWERS

There are at least four "lost" meteor showers, recurring rains of shooting stars that are sometimes quite spectacular and some of which have continued for centuries.

Meteor showers generally arise from comets which disperse particles along their orbits around the sun. The streams bombard this planet with meteorites as they pass close to it. More than a dozen of these showers are well known. They can be predicted with considerable accuracy, within a day or two, and the comets with which they were associated have been identified. The showers are named for the constellations from whose direction come the majority of the shooting stars, such as the Aquarids, Orionids, and Leonids.

Records of these shooting star showers for nearly 2,000 years, from 15 B.C., have been compiled from Japanese, Chinese, and Korean records by Drs. Sasumu Imoto and Ichiro Masegawa of the Calendar Association of Japan. Their report has recently been published by the Astrophysical Observatory of the Smithsonian Institution.

They consider as a recurring shower all that have occurred several times from approximately the same locations in the heavens and at approximately the same times. Thus they were able to identify the Lyrids, Aquarids, Perseids, Orionids, Leonids, and Adromedids. One of these, the Perseids, which occurs annually about August 12, has been traced back to a first report in A.D. 36.

But four, recorded at least three times, seem to have completely vanished. Perhaps after many passages the fragments that composed them have long since been entirely depleted or perhaps their orbits have been tilted around away from the earth's path in space. (- Smithsonian Institution)

DUES ARE DUE!!!

A PHENOMENAL LANDSLIDE*

By
D. D. Clarke, M. Am. Soc. C.E. 1/
Abstracted by Fay W. Libbey

"The gravity system of water works constructed during the years 1893 and 1894 by the Water Committee of the City of Portland, Oregon, included a series of four reservoirs for supplying the different districts of the City. Reservoir No. 1 with a capacity of 12 000,000 galls. and No. 2 with a capacity of 20,500,000 galls. supply the East Side District, and Reservoir No. 3 with a capacity of 16,400,000 galls. and No. 4 with a capacity of 17,700,000 galls. supply the West Side District. Two of these reservoirs Nos. 3 and 4. on the West Side, were built in a narrow ravine occupying a portion of the City Park, about two miles west of the business center of the city. The lower reservoir has an elevation of 220 ft. and the higher one 290 ft. above mean low water level of the Willamette River These two reservoirs were formed by dressing down the banks of the ravine in which they are located; and, since their completion, a serious derangement of the western slopes of both reservoirs has taken place, owing to a movement of the adjacent hillside.

"The magnitude of this movement was not understood at first, but it has since been found to extend for nearly the full length of both reservoirs, a distance of about 1,100 ft This distance may be called the approximate width of the slide at its lower or eastern end At the apex or western end it is about 400 ft. wide, and its length from east to west is approximately 1,700 ft. The depth, as determined at various places, ranged from 50 to 112 ft . and the surface area approximates 30 acres. The volume of the moving mass has been estimated at 3,400,000 cu yds.

"Taking into consideration the characteristic features of this movement its length, breadth and depth, and the uniformity of the movement of the sliding mass, it may be truthfully called "A Phenomenal Land Slide." It is the purpose of this paper to describe the surveys and explorations which have been made during the last nine years, for the purpose of determining the dimensions of this slide and its probable cause, and to aid as well in devising a plan for the cure of the difficulty.

"The writer has been engaged in the services of the Water Committee since March. 1893. and for the past seven years has had engineering charge of all construction work. He has therefore had personal knowledge of the work from almost the very beginning. and the surveys and explorations described in the paper have been made largely under his personal supervision.

"In order to reach a correct understanding of the situation of these reservoirs. and the reasons which led to their location at the point named, a few words regarding the physical characteristics of the region may be necessary. The City of Portland is largely built on the lower slopes of a range of hills bordering the Willamette River on the west. For a distance

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1/ With discussion by Geo. L. Dillan, Arthur L. Adams, James D Schuyler, and D. D. Clarke. Reprinted from Transactions of the American Society of Civil Engineers, vol. LIII (1904), 90 p., 26 illus., 10 tbls.

* Footnote: In looking over references in the Portland Public Library on subsidence I found a title to a paper as given above which was tied to the Portland. Oregon City Park. I examined the paper and later mentioned it at a G.S.O.C. luncheon. Nobody at the luncheon had previously heard of the paper and as a consequence Ray Baldwin asked me to review it in an article for the News Letter. The accompanying condensed version is the result. Parts of the text are quoted and other parts are abridged in order to reduce the volume of 90 pages.

Mr. Clarke's comprehensive report has historical as well as geological and engineering interest. Now especially it is pertinent because, according to newspaper accounts, ground movement at the City Park reservoirs is again plaguing City authorities.

The paper does not have chapter or subheadings.

Fay W. Libbey

of between one and one and a half miles from the business district the slope is quite gradual, rising in that distance to an elevation of from 150 to 250 ft. Beyond that point the hills rise more abruptly and reach an elevation of from 800 to 1000 to 1200 ft. in a total distance from the river of three miles or less. (See Plate XVII.)

"Flowing down the eastern slope of this range of hills there are several small streams which discharge into the river within the city limits through conduits of large size. These streams, though small, have furrowed out channels for themselves, which, on their upper courses, vary in depth from 40 to 200 ft below the general level of the adjacent ridges. One of the largest of these streams is known as Tanner Creek, its lower portion being now confined in a brick sewer, approximately 6 ft. in diameter. The upper or western end of this sewer is near the southeast corner of the City Park, and only a few hundred feet from the site of Reservoirs Nos. 3 and 4, to which this account refers. Above the head of this sewer the valley of the south or main branch of Tanner Creek is about 150 feet wide, with side slopes of from 1 on 1 to 1 on 3 or 4 horizontal, and with almost perpendicular bluffs of basaltic rock at a few points.

"The reservoirs described are on the north branch of Tanner Creek, which flows from the northwest through a corner of the City Park and unites with the main creek at the head of the brick sewer to which reference has been made. The total length of this branch is somewhat more than one mile, and its total fall of about 500 ft. During the dry season the flow is insignificant, and, for several months, it disappears almost entirely.

"The selection of this ravine for the site of the two reservoirs required for the west side of the river, was due chiefly to its favorable location for securing the desired elevation at the most accessible point for making connection with the system of pipes then in use. Besides, the land for one reservoir was already owned by the city, and the additional ground needed for the second or low-service reservoir, adjoining the City Park and combined with it, could be purchased upon favorable terms.

"There are other ravines of a similar character both north and south of Tanner Creek, but none more accessible or apparently more favorable as a reservoir site. The location of the reservoirs upon level ground, or outside of some ravine, was not regarded as feasible, within the required limits as to distance and elevation. At the points chosen for the reservoirs, the original bed of the ravine was quite narrow, from 20 to 50 ft., with sides sloping back about 1 or 1-1/2 to 2-1/2 horizontal, to a height of about 50 ft. on the east, and on the west about 100 ft. above bottom.

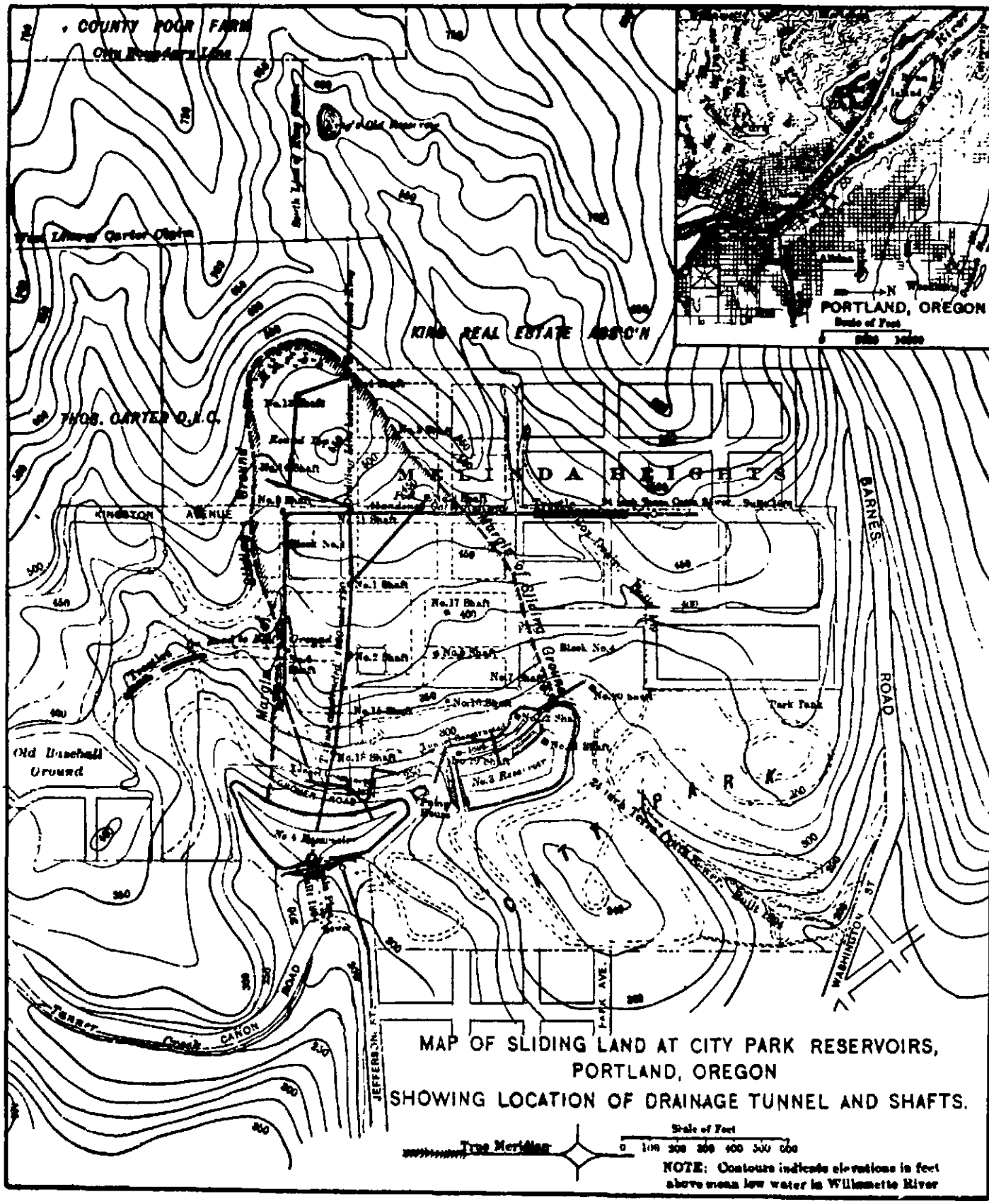
"The material composing the hillside as far as appeared from the borings and examinations made before the excavation of the reservoirs was undertaken, was yellowish sandy clay upon the surface, but only a few feet in depth, with basaltic rock underneath. The character of the underlying rock was not then known, further than what could be seen at several points where a bluff a few feet high showed rock at the surface, and at one point, 200 yds. down stream, where a perpendicular bluff 50 ft. high was exposed. From these indications the general basaltic character of the rock was known. Where exposed the rock was full of seams, but appeared to be sound in place.

"Along the banks of Johnson Creek, which flows in the next ravine north of Tanner Creek, about one-third of a mile from Reservoirs Nos. 3 and 4, similar bluffs of basalt can be seen, a road-metal quarry having been opened at one point exposing a vertical wall, from 50 to 75 ft. high, which shows plainly the general character of the material."

Here the author quotes from A Geological Reconnaissance in Northwestern Oregon, by Joseph Silas Diller, to point to geological features of the Portland area. In this report Diller states that according to Professor Thomas Condon the land of western Oregon subsided during the Pleistocene epoch forming the Willamette Sound. Accurate determination of the depth was not possible but Condon indicated that it extended as far south as Spencers Butte, three miles from Eugene. "He estimated the depth of the place where the City of Portland now stands to have been 325 feet." Diller questioned this estimate and states the depth was much greater, possibly 600 feet judging from evidence on Portland Heights. Diller did not commit himself on correlation of age of Portland Heights sediments with those on the coast *

* Anyone wishing to get further information on age and stratigraphy of Portland area sediments could consult the following authors: R. C. Treasher (1942), W. D. Lowry, E. M. Baldwin (1952), and D. E. Trimble (1957). F. W. L.

Plate XVII


COUNTY POOR FARM
KING REAL ESTATE ASS'N
THOS. CARTER D.L.C.
M E L I N D A H E I G H T S
KINGSTON AVENUE
BARNES ROAD
Old Baseball Ground
Tank Farm
Tanner Creek Canon
JEFFERSON ST.
PARK AVE.
WASHINGTON ST.
PORTLAND, OREGON
MAP OF SLIDING LAND AT CITY PARK RESERVOIRS,
PORTLAND, OREGON
SHOWING LOCATION OF DRAINAGE TUNNEL AND SHAFTS.
True Meridian
Scale of Feet
NOTE: Contours indicate elevations in feet above mean low water in Willamette River

Clarke writes that on December 31, 1898, in an excavation at the site of Reservoir No. 3 (upper reservoir) a fossil was found embedded in a deposit of blue, sandy clay 41 ft below the surface and 17 ft. above bedrock in connection with small pieces of wood and a few water worn pebbles The fossil was classified by Mr. F. A. Lucas of the National Museum as the left lower molar of a camel. He reported that "It is probably Camelops Kansanus Leidy. This species has been ascribed by both Leidy and Cope to the Pliocene, while Wortman reports it from the Pleistocene."

Clarke next described a cable railway which was built in 1891 and 1892 from the business portion of the city westerly to the southeast corner of the City Park, thence westerly across the ravine in which the reservoirs were built later, and ascending the steep slope of the ridge for a distance of 1500 feet, thence northerly along Kingston Avenue on a nearly level grade for about 1200 ft. to the end of the line. Service was suspended during the winter of 1892 but resumed in May 1893 and continued until the following September when it was discontinued owing to removal of the bridge across the site of Reservoir No. 4. The owners preferred to abandon the line rather than protect it according to their right-of-way agreement.

During grading of property in the real estate development west of the reservoirs, ravines were filled without providing proper drainage. In two of the larger ravines rough log culverts were built but soon became choked and useless.

During the winter of 1893-1894 a committee of citizens called "The Committee of One Hundred" was occupied with conduct of City government and it especially criticized the new water-works department and The Water Committee consisting of fifteen leading men of the city named for the position in the legislative act authorizing the work Criticism was aimed chiefly at the engineers of the Water Committee for recommending the location of important reservoirs in the City Park. The Water Committee then called on the engineers for a report on conditions.

In brief the report gives the reasons for selecting the City Park as reservoir sites because of favorable elevation of the ravine chosen and lack of any other suitable sites for construction of reservoirs at the proper elevation on the steep slopes of the west hills. It mentions the fears of the King Real Estate Company that the hill sloping downward to the west line of the City Park rested on a bed of clay underlaid by rock; that the clay when wet would become soft and slippery thus causing the hillside to slide down into the upper reservoir and be dumped into the lower.

The report concludes with this paragraph:

"The side slopes of the reservoir have not yet been cut down to firm material, and the wash of the surface soil by the heavy rains of last winter gives to the excavation a very rough appearance; but there have been no large displacements or slides, and, in our opinion, there is no danger in the future of any slide of sufficient magnitude to injure the reservoirs."

According to Clarke the publication of the report appeared to satisfy The Committee of One Hundred and in the final report of this committee made to the citizens several months later, there was no reference to the reservoir investigation. However, he states that the engineers of the Water Committee appeared "to indicate failure to comprehend the magnitude of the difficulties with which they had to contend."

Clarke states that surveys and borings which determined the selection of the City Park as the site for the reservoirs were made chiefly in 1887, supplemented by additional borings in early 1893.

Reservoir construction was pushed during the spring and summer of 1894. Excavations for the reservoir basins were not completed until about September 1, 1894.

Early in August, and before the west slope of Reservoir No. 4 had been cut down to its intended position, a slip in the bank was noted about midway on the slope opposite a point where the basin was about 30 ft. deep. Basin slopes were 1 on 1-1/2. This slip was along a seam between strata of blue and yellow clay (blue below). The dip of the seam was westward into the hill with slope 1 vertical and 10 horizontal.

Clarke describes the "deep yellow and red clays" found at different points as plastic with little sand and "resulting from decomposition of underlying lava." In some borings, however, he found the process of decomposition incomplete and the material contained grains

and small fragments of rock. The seams of blue clay near bedrock were tough and plastic but in larger bodies at higher levels it contained considerable fine sand. He said that in some deposits small pieces of wood and water worn pebbles were found and the evidence pointed to a sedimentary origin.

At about this time there was a local slip near the same point as the slip referred to above which extended a few feet into the bank, and was refilled to support a part of the parapet wall and slope lining

A few days observation of the movement of the first slip mentioned above showed that the break extended 200 feet south and 100 feet north from the point where it first appeared for a total length of 300 feet. When first observed the movement was at the rate of 1/2 inch per day but he states "this did not continue long."

It was decided to overcome the difficulty by building a concrete retaining wall in front of the slip and below the reservoir lining. This wall was 320 feet long and 4 feet thick and the section (as illustrated in the text) shows 8 feet as the height at the upper or high point. A drainage tunnel was constructed in the rear of the wall following the seam between the blue and yellow clay along with a mixture of loose rock found to be water bearing. The tunnel extended the full length of the buttress and 50 to 100 feet westward therefrom, tapping several small pockets of water.

After completion of the wall it was watched for "some days," and as no further movement appeared it was thought that it had been checked. Therefore the lining of the west slope was completed and the reservoir made ready for use. Filling of the reservoir was completed December 17, 1894.

The bottom and lining of west slope of Reservoir No. 3 (upper) was completed in September 1894 when it was discovered that the concrete lining in the bottom had bulged up at one point just north of the center. This break was repaired on September 8 but another one was discovered in the bottom "near the foot of the west slope and opposite the former break." This difficulty was thought to be due to quicksand and clay in the bank behind the facing upon which the slope lining had been laid.

It was decided, then, to construct a concrete buttress wall about 100 feet in length (section of wall shown in text) along the west face of the reservoir lining and to drive a drainage tunnel into the west bank at berm level to take ground water away from the reservoir lining on that side. This work was completed early in December.

On December 14, 1894, when the reservoir was being filled 'two cracks in the bottom were discovered near the south end of the buttress which was completed but a short time before, but the full significance of the new cracks was not discovered until after the reservoir had been filled." Orders to empty the reservoir were given and this was accomplished December 20th.

It was decided then to run a drainage tunnel in the west bank of the reservoir similar to the one at Reservoir No. 4 but on a grade parallel with the bottom of the reservoir basin.

This tunnel had its outlet connecting with the sewer at a point between the power house and Dam No. 3. Construction occupied several months and was completed along the entire western margin of the reservoir. Drain pipes were placed in the bottom of the tunnel and the excavated material replaced as it was thought the needed drainage and protection work had been accomplished.

Evidence of pressure against reservoir walls continued. A crack was observed in the west wall of No. 4 in January 1895, a few weeks after the basin was first filled. Other cracks followed and by April the parapet was broken in several places and the lining was cracked about 6 feet below the berm walk for a distance of 300 feet. The upper part of the lining and part of the parapet wall had been lifted clear of the ground and the wall tilted to the west. Maximum observed movement of the parapet from December 31, 1894 to October 11, 1897, was 3.24 feet. *

During June and July 1895 the small movement, which had been observed, ceased so that repair work was done in August and September. Additional drains were laid under the floor of No 3 and on the west slope to protect the concrete. Also thickness of the concrete on the floor was increased to 10 inches. Repairs had hardly been completed and the basins partly filled with water before it was apparent that the pressure from the adjacent banks was as great as ever. New cracks appeared and increased movement was indicated by a re-survey of range lines previously established.

*Note: This figure is later given as 169 feet. No explanation of the disparity is evident. F. W. L.

(to be continued)

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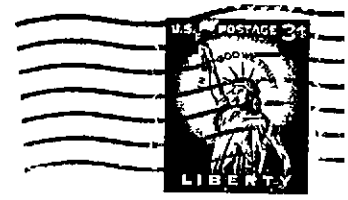
OFFICIAL PUBLICATION OF THE

March 1959 PORTLAND, OREGON



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Persons desiring to become members should contact the Membership Chairman, Mrs. William F. Clark, 3613 S. E. 9th Avenue, Zone 2, Phone: BE4-7096. Regular annual dues (single or family memberships) are $5 for residents of Multnomah and adjacent counties $2.50 for others; and $2 for Junior Members Make remittances payable to the GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Society Activities
(See "Calendar of the Month")

Evening Meetings: Formal lectures or informal round-table discussions on geological subjects, on the second and fourth Fridays of each month at Public Library Hall, S.W. 10th Avenue and Yamhill.

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Library Night: Once a month. Lewis and Clark College.

Luncheons: Informal luncheons, with geological motif, each Thursday noon in Room B, Chamber of Commerce Building, S.W. 5th Ave. and Taylor St $1.00 per plate.

Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon at Portland Chamber of Commerce, 824 S.W. Fifth Avenue, second floor. One dollar. You are welcome.

BANQUET NEWS

Friday March 13

Friday, March 13, will be a great day in the history of G. S. O. C., for in the evening the members of this Society will assemble at not later than 6:30 and do full justice to a fine banquet which The Dorcas Society of Mt. Tabor Presbyterian Church will have prepared for us. Following the dinner we will hear words of wisdom from the retiring President, Dr. James Stauffer; and the incoming president, Paul Howell, will outline his plans for the coming year. Al Keen may also have some words of wisdom as he unfolds "A Glimpse of the Present with a Past".

Price for meal plus program will be just $2.30, and children under 12 may dine for the small price of $1.65. These are bargain prices so get your reservations in and come out and enjoy the fun. Ticket sales, Leo Simon.
It has been one year since our last banquet, and all I can say is that time has dealt kindly with the ladies of our group. So don't forget time, 6:30 March 13, and place, Social room of Mt. Tabor Presbyterian Church at 55th and Belmont.
Chairman of banquet, Mrs. Hayward Peirce, AL 3-8046.

Tuesday March 17 8 P.M.

Library night - Lewis & Clark College. Leo Simon will show specimens of copper minerals.

Friday March 27

Lecture. Mr. Irving Jones, speaker, "The Fish Problem at Ox Bow Dam". He will also show slides. Mr. Jones is with the Oregon State Fish Commission.

FIELD TRIP
March 28, 1959

Meet at Mollala 9:00 a.m., Saturday, March 28, 1959. This is a fossil collecting trip to several new leaf and marine beds.

Bring your picks, hammers, lunch, water, and raincoats. Round trip about 100 miles. Leaders: Murray Miller and Rudolph Erickson.

Thank you,
Franklin Brown.

NEWS OF MEMBERS

It has been reported that Dr. Ewart Baldwin's book on Oregon Geology will be off the press next month.

In the January 30 issue of the Vanguard, the bi-weekly paper of the Associated Students of Portland State College, on page 3, under Geology Department notes, is an article by George Adams, entitled "PSC Geology Experts Study Rare Meteorite Found Here". This meteorite was found near Sandy Boulevard on the road to Troutdale. Accompanying the article is a picture of Dr. John Allen and Dick Walker making a specific density determination on this meteorite. Dick's facial decoration in this picture bids fair to winning a prize in his age-group at the Centennial.

In the January issue of the Ore.-Bin, appears an article by Ralph S. Mason, entitled "Oregon Mineral Industry in 1948". While there are some recessions shown in activities, Mr. Mason goes on to show the value of minerals produced in 1958 was within a fraction of 1 percent of the all-time high reached in 1957 - despite a general business recession during the year.

- - - - - - - - - - - -

VOLUNTEER WORKERS NEEDED

There is a big demand right now for volunteer carpenters to help build shelves and drawers at the Oregon Museum of Science and Industry. The Museum is also greatly in need of lumber, standard dimension 2x4s and 1x4s, and ship lap stock. Mr. Lloyd Ruff who is in charge of the project, suggests the use of packing case parts, freight car batting, and lumber from wrecked buildings All donations gratefully accepted.

Those interested contact Mr. Ruff or OMSI.

- - WATER SUPPLY INFORMATION AVAILABLE

Information on quantity and quality of surface waters in the State has been issued recently by the Surface Water and Quality of Water branches of the U. S. Geological Survey. Data presented include measurements of streams, lakes and reservoirs in various drainage areas, and temperatures and chemical analyses of some of these waters. The information is contained in Water Supply Papers 1293, 1318, 1344, 1430, and 1447, and may be obtained from Superintendent of Documents, Washington 25, D. C.

-The Ore. -Bin, Jan. 1959

KLAMATH RIVER BASIN DESCRIBED

The U. S. Geological Survey has just released an open-file report entitled "Preliminary Report on the Ground-Water Resources of the Klamath River Basin, Oregon." Authors are R. C. Newcomb and D. H. Hart of the Survey's Ground-Water Division in Portland. The report discusses the geography, geology, and hydrologic conditions of this large basin, and tabulates records for wells, springs, and chemical quality of the water. Included are two maps (4 parts each); one map shows the location of the representative wells and springs and the other shows the distribution of the geologic formations, which range in age from pre-Tertiary to Recent.

This report is not for distribution, but may be consulted at the following places in Oregon: Geological Survey, 1001 N. E. Lloyd Blvd., Portland; State Engineer in Salem; Klamath County Agricultural Agent in Klamath Falls; this Department in Portland and its branch office in Grants Pass; and local public libraries.

- State Dept. of Geology and Mineral Industries.
Ore-Bin - Jan. 1959

In the December 1958 issue of New Publications of the Geological Survey, the following announcement appears:

New and Re-survey Maps

Oregon - McMinnville (1957)
Siltcoos Lake (1956)
Sparta (1957)

Revised Maps

Oregon; Tidewater (1942-56)

NEXT AUDUBON SCREEN TOUR

MONDAY, MARCH 23, 1959

Speaker: G. Harrison Orians
Subject: Great Smoky Skyland

* * * * * * * * *

CORRECTION! Please note the typographical error on Page 14 of your February Newsletter. You will notice in the footnote we have stated "This figure is later given as 169 feet." This figure should be 1. 69 feet.

Have you paid your dues??

A PHENOMENAL LANDSLIDE

By

D. D. Clarke, M Am Soc. C. E.

Abstracted by Fay W. Libbey

(Continued from February Newsletter)

At this stage of the adventure correspondence with Robert L Harris, a prominent engineer, elicited the opinion that the whole hillside was moving forward on a seam of clay and that the movement was caused by a "hidden spring." At first this condition "was not deemed to be within the bounds of possibility, because of its magnitude. However, it was observed that movement continued even after several months of dry weather, and a broader search for surface evidence was begun." Clarke states that he explored the vicinity of the old cable track on Kingston Ave. and detected a slight bend in the rails. Further exploration together with instrumental surveys "resulted in locating the head of the slide in a marshy depression in the hills about 600 ft. west of the cable track and some 1700 ft. or more from the reservoirs." (See Plate XXII.) The depression was about 300 ft. long and 30 to 60 ft. wide. Topography indicated that water when stored in the depression could not have been more than 2 or 3 ft. deep. When first found no water was present on the surface. Subsequently a "peaty formation," 15 to 20 ft. deep with clay underneath, was found to underlie the surface which was covered with swamp grass, weeds, and brush.

Surveys showed that the deflection in alignment of the cable track at the center of the slide amounted to 2.2 ft. Examination failed to show any surface cracks, parallel with the reservoirs, at any point between the reservoir basins and the swampy ground at the head of the slide. However, a distortion in the rails of the cableway was found about 500 ft. up the hill from Reservoir No. 4.

During the latter part of 1895 and the first half of 1896, twenty-nine range lines were established. About half of these were observed at intervals of one month for a period from three to five years. It soon became evident that the movement was confined to the ground west of the reservoirs and within the limits of the ravines extending west from City Park.

The surface of the ground above the reservoirs has shown only one crack 125 ft. long and 200 ft. west of the power house and Dam No. 3. This crack appeared May 1896, or 18 months after the reservoirs were excavated. It was obliterated in a few months. Other larger cracks were found at this time around the margin of the marshy ground and these increased so that during 1897 the outline of the movement could be traced by an almost continuous break in the ground.

It was now determined to explore the depth of the slide, the area of the slide, and if movement was on or near bedrock. Therefore, between September 27, 1895, and March 31, 1896, 25 drill holes were put down aggregating 1,710 ft. The holes were 4 in. in diameter and were cased to bedrock with the drill going 5 ft. into the solid bedrock; some were drilled deeper than 5 ft. into bedrock. Prices paid for drilling earth and loose material was $1.25 per linear foot, and $3.00 per ft. for solid rock. These prices were for use of plant and labor. Other expenses were extra. Total cost averaged $1.68 per linear ft.

After the holes were drilled, movement of the ground was determined by observations on a small diameter pipe inside the casing, and was found to be taking place at or near bedrock and at depths between 50 and 112 ft. below the surface. Water sometimes rose in the casings indicating water pockets.

Early in the spring of 1897 it was decided that sufficient proof had been established that the cause of the slide was essentially ground water fed by springs, and Mr. Clarke presented the Water Committee plans for a drainage project and estimate of its cost.

The Water Committee now engaged Colonel G. H. Mendell of Corps of Engineers, U. S. A., as a consulting engineer to advise on curing the trouble. He approved a plan of sinking open 3-1/2 x 3-1/2-foot shafts for exploratory purposes to study the character of the bedrock. Twenty-two shafts were sunk all cribbed from the surface. Aggregate depth was 1,497 ft. with 454 linear ft of tunnel connections. Also 677 linear ft. of borings were made to determine character of material and depth to bedrock in areas not previously explored. Much new information was obtained, especially concerning the clay on and near bedrock, and the flows of ground water.

This work continued from July 19, 1897, to January 24, 1899. Clarke gives logs of the shafts and new drill holes, and he described difficulties of handling excessive flows of water especially in Shaft No. 1. Here a large pocket of water was encountered at a depth of about 68 ft. Pumps were installed but sinking was very slow for several months from August 6, 1897. The shaft was not completed until January 31, 1898. He describes also character of material found in Shaft No. 4 and the tunnel from this shaft as well as ground-water conditions in the various shafts and tunnels.

In 1898 there was 667 linear feet of borings at an average cost of $1.13 per lin. ft.

In 1895-1896 there was 1,710 linear feet of borings at an average cost of $1.68 per lin. ft.

In 1897, 1898, and 1899 there was 2405 lin. ft of shafts and equivalent tunnels at an average cost of $3.42 per lin. ft.

Laborers' wages were $1.75 per day of 10 hours.

Clarke summarizes results of the studies so far as follows:

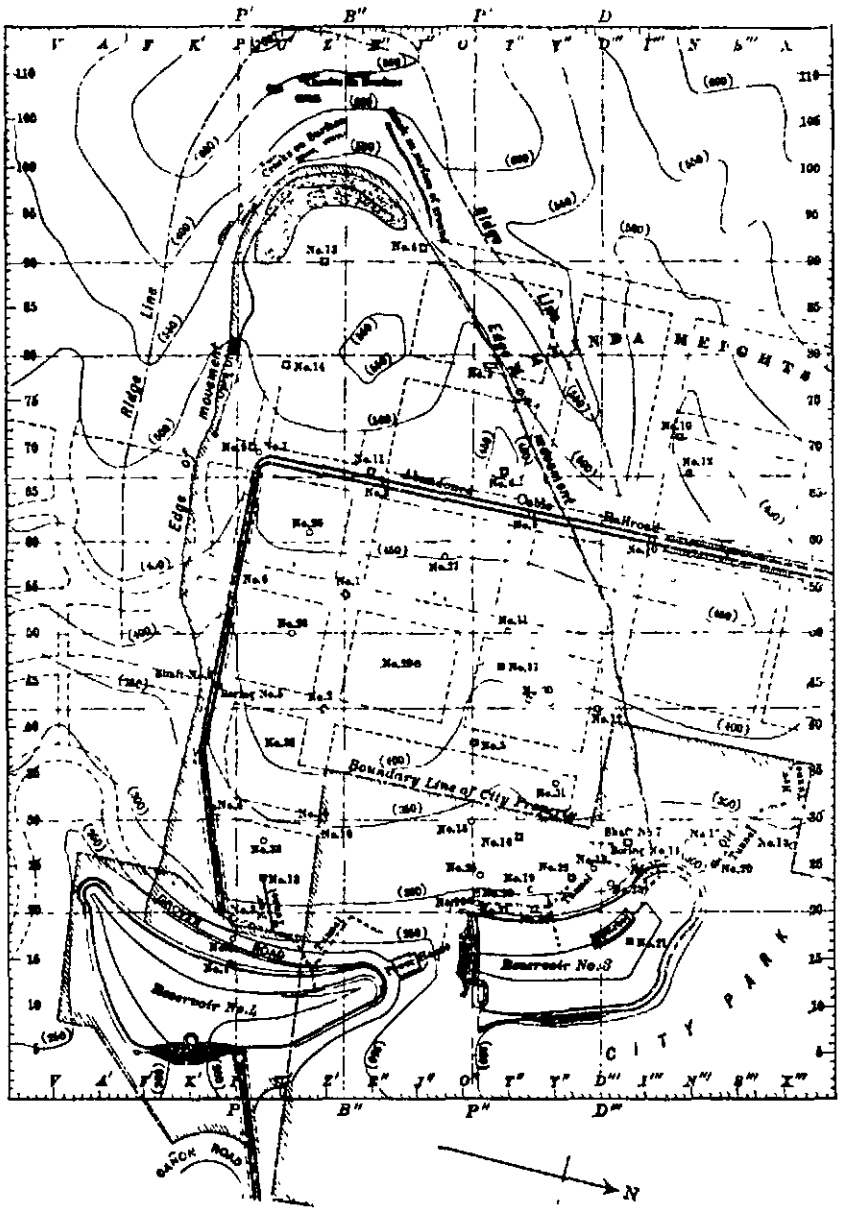
"(1) The approx. length of the sliding ground was 1,700 ft.
(2) The approx. width of the sliding ground along the west margin of the reservoirs was 1,100 ft.
(3) The approx. width of the sliding ground at its west end was 400 ft.
(4) The approx. surface area of the sliding ground was 29.27 acres.
(5) The approx. bedrock area of the sliding ground was 23.65 acres.
(6) The approx. area of the water shed, which includes the western end of the sliding tract was 26.46 acres.
(7) The minimum depth of the body of the slide (Shaft No. 6) was 46 ft.
(8) The maximum depth of the body of the slide (Shaft No. 2) was 112 ft.
(9) The average depth of the slide at 16 shafts in the main body of the slide was 77.8 ft.
(10) The approx volume of the sliding mass was 3,400,000 cu. yds.
(11) The approx. weight of the sliding mass was 4,600,000 tons.
(12) With each returning dry season there was a marked lessening of the movement, followed by an increase during the winter indicating an intimate relation between the volume of monthly rainfall and the rate of movement.
(13) The surveys thus far made do not determine that the movement is at a uniform rate at the center and along the sides of the sliding ground, but probably there is little difference.
(14) Apparently the movement at the surface and on the bedrock is uniform.
(15) Apparently there is a slight southerly movement taking place near the west end of the slide and a northerly movement as well at the central portion, the bedrock being slightly inclined in these directions as well as to the eastward.
(16) The uniformity of the movement of the slide is indicated by the absence of surface cracks across the central portions of the sliding tract.
(17) That the movement originated in the unstable mass near the western end of the sliding ground is indicated by the condition of the joints in the rails of the cable road where running east and west. When first examined in Sept. 1895 these joints were all tightly closed. The rails were also distorted at the angle just east of Shaft No. 6. These conditions indicate that the pressure was mainly from above and that there had been no drawing away of the foot of the slope at the reservoirs, or in other words, that the movement did not originate at the reservoirs.
(18) The breaks in the lining of Reservoirs Nos. 3 and 4 and also at the buttress built against the lining of Reservoir No 3 have been caused by the movement of the slide, and are not due to local slips, as first supposed.
(19) From shaft excavations, the character of the materials forming the mass of the slide had been determined to be largely of broken rock of small size mixed with clay. Across the central portion of the slide, in the vicinity of Shaft No. 1, the clay and fine material

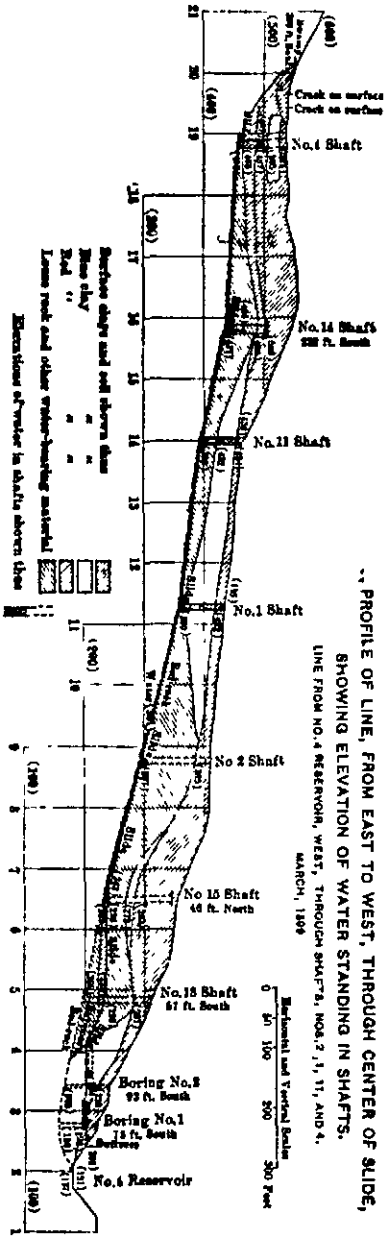
Footnote: For 6-month periods from December 1895 to November 1898 rainfall ranged between a low of 13.12 in. and a high of 27.58 in. For corresponding periods average maximum movement per month ranged in feet between a low of 0.01 and a high of 0.22. It was stated that the 6-month period following November 1898 showed a very marked increase in the rate of movement but the figure is not given.

F.W.L.

PLATE XXII.
TRANS. AM. SOC. CIV ENGRS.
VOL. LIII, No. 984.
CLARKE ON A PHENOMENAL LAND SLIDE.

Map of Slopes
West of Reservoirs Nos. 3 and 4
City Park, Portland, Oregon





PROFILE OF LINE, FROM EAST TO WEST, THROUGH CENTER OF SLIDE, SHOWING ELEVATION OF WATER STANDING IN SHAFTS.
LINE FROM NO. 4 RESERVOIR, WEST, THROUGH SHAFTS, NOS. 2, 1, 11, AND 4.
MARCH, 1909

FIG 4.

predominate, forming a dike measurably impervious to water. Eastward from that point, the material contains less clay and does not hold a large quantity of water.

To the west of Shaft No. 2 and also near the head of the slide, the excavations developed at some points quite a body of clay Between shafts Nos. 1 and 11, and still farther west, water pockets of considerable magnitude have been found. From the pocket in connection with Shaft No. 1 more than 3,900,000 galls. of water was pumped before the supply was exhausted; and, from one connected with Shaft No 11 about 500,000 galls. was pumped before work was abandoned at that point, this effort having lowered the water but a few feet.

(20) As a rule, there seemed to be no direct connection between the different bodies of underground water, or between the several shafts and borings.

(21) The several bodies of water discovered were all in close contact with the clay stratum forming the bed of the slide, and, undoubtedly, have had much to do with continuance of the movement. This is shown by the decrease in the movement which occurred between Dec. 1897 and Nov. 1898 during which period the underground reservoir connected with Shaft No. 1 was drained by pumping.

(22) Comparing the rate of movement of the slide at different seasons of the year with the volume of the rainfall during the same period, and noting also that a greatly reduced motion ensued during the time that the drainage of Shaft No 1 was in progress, succeeded by an increased movement during the following winter when the shaft was again filled, it seems reasonable to conclude that the movement was largely if not entirely due to the presence of water in the underground reservoirs. It follows naturally, therefore, that the permanent removal of underground waters would produce a permanent cessation of the movement.

"The conclusions of the consulting engineer were practically in accord with the foregoing statements. His report also contained interesting references to the probable origin of the slide as well as recommendations regarding the best method of overcoming the difficulty."

During the latter part of 1897 when it became known that the Water Committee had caused an examination of the slide with a view of determining the best method of restoration, the owners of about five-sixths of the moving ground instituted suit against the City for damages to their property. They claimed that excavation of the reservoirs in the autumn of 1893 and spring and summer of 1894 was the cause of the movement, and in consequence their property had been damaged to an amount aggregating $439,000.

The King Real Estate Association claimed damages to land of $169,000 and injury to the cable railway of $100,000 or a total of $269,000. The second suit by L. F. Grover et al. claimed damages to 22.5 acres of land at $5,000 per acre, or $110,000, and damages to their interest in the cable railway of $60,000, making a total of $170,000.

The value of these tracts of land on the assessment roll for the year 1897 was:

King Real Estate Association, 97 acres.....	$33,000
Grover et al. West End Addition, 51 acres.....	28,100
Grover et al. West End Addition, 77 acres.....	23,000
Total.....	$84,100

The report of the consulting engineer had been submitted to the Water Committee during the preceding March but had been withheld from publication on account of the damage suits which had been instituted and in order not to prejudge the case in advance of the trial; also, so that conclusions of the report could be presented first as testimony for the defense.

The trial began Nov. 7, 1899. The fact that the cable road had been in successful operation for nearly a year before beginning of reservoir construction without any difficulty in its operation was regarded as indicating in favor of the plaintiff that reservoir excavation started the land movement.

Clarke states that investigations by the engineers seemed to point conclusively to the fact that the movement must have been in progress for some years but it was impossible to determine when the movement began. The hillside was covered with a forest of firs and cedars together with a smaller growth of underbrush making inspection of the surface of the ground nearly impossible. In addition when the reservoir construction was begun, the banks of the ravine in which the reservoirs were located were covered with fallen timbers and dense brush precluding visual inspection of the ground surface for evidence of movement.

Evidence to support the "ancient slide" idea was found to be widespread among men employed in surveying, building, and operating the cable road. So many witnesses were offered who could testify concerning the movement of the tract at certain points that the court declined to hear them all considering that the fact was well established.

The engineers employed as expert witnesses formulated the theory of an "ancient slide."

They organized the evidence as presented above especially in the form of exhibits such as charts of data on rainfall and ground movement as well as relevant records of the shafts and drill holes. A plaster-of-paris model of the reservoirs and sliding ground, including the watershed surrounding the head of the slide on a scale of 1:600 proved to be interesting and valuable.

This model showed the original ravines in which the reservoirs are located and the volume of material excavated, as well as the location and depth of the ravines filled by property owners without providing adequate underdrainage. The mass of the slide was also cast in a separate block so that it could be removed to show depth of the slide and inclination of the bedrock. "From this model was shown the relative insignificance of the volume of the material removed in excavating the reservoir basins, which amounted to only about 3 percent of the mass of the slide, and the improbability that the removal of this small amount could have caused a movement of the slide of the magnitude known to exist."

Clarke discusses at length the relation between rainfall and ground movement as shown by their records.

The damage suit terminated November 28, 1899, with a verdict in favor of the City. As a result, the second suit was not pressed and the several owners of the sliding land offered to sell nearly 60 acres to the City including the sliding land and surrounding watershed. The asking price was regarded reasonable and purchase of the land was completed a few months later, in May 1900. The tract was added to the City Park making a total of 100 acres available for park purposes.

The final plan for drainage of the slide area consisted of driving timbered drainage tunnels commencing at the lower end of the tunnel at the bottom of Reservoir No. 4 and also at one or more of the exploration shafts which had been previously opened to bedrock, the line adopted for the main tunnel passing through Shafts Nos. 18, 2, and 1 to Shaft No 11 at the cable road. Work was started July 2, 1900. To expedite the work, day and night crews were employed, part of the time at two headings. Comparatively little water was encountered until the tunnel reached the vicinity of Shaft No. 1, 912ft. from Reservoir No. 4. It was estimated that 1, 800, 000 gals drained away in 20 days, by which time the flow diminished to about 25, 000 gals. per day. When Shaft No. 11, 1, 175 ft. from Reservoir No. 4, was reached the flow was at the rate of "165, 000 galls, a day for a number of days." The main drainage tunnel, with branches to the northwest, west and south, was completed on September 11, 1901.

The tunnels comprised 2, 507 lin. ft. and cost $14, 161. 14 or $5. 65 per ft. Wages paid were, for outside laborers, $2 per day of 10 hours; for tunnel men, $2. 25 and $3. 00 per day.

The sewer for carrying surface water from the King ravine into the Washington Street sewer, constructed as a part of the contract for transfer of the property purchased by the City and consisting of 1602 ft. or 24-inch terra cotta pipe and 148 ft. of cast iron pipe, was completed in November 1901 at a cost of $5, 123.

Clarke comments that "The results of the drainage work have been very satisfactory, for during the two years which have elapsed since the tunnels were completed, there has been no appreciable movement of the slide . . . .

"The flow of water from the tunnel drains has been observed at frequent intervals since their completion, and the daily flow has been found to range between 10, 000 and 15, 000 galls, during the summer, and from 25, 000 to 50, 000 galls. during the winter. After severe rain storms the flow sometimes increases to 75, 000 galls. per day for a short time . . . .

"The work of replacing and repairing the broken linings of the reservoirs is yet to be done, and also that of making permanent the tunnel drains . . . .

"Plans are in course of preparation for this repair work, and also for a concrete sewer to be built inside the drainage tunnel, so as to provide a permanent outlet for all waters percolating through the body of the slide and reaching bedrock. When this work is accomplished, the "landslide" at the Portland reservoirs will have become an event of the past, and will soon be forgotten by all but those who have been intimately connected with the work."

As a sort of postscript to the report, Clarke mentions the heavy rainfall of the winter of 1903-1904. From November 1, 1903, to March 28, 1904, the precipitation for this period was 38. 79 inches or about 85 percent above the yearly average. Volume of tunnel drainage was at times at the rate of more than 100, 000 gals. per day. A small increase in movement of the ground was noted.

Clarke adds finally, "The effects of the present severe storms are simply regarded as so many indications that the tunnels already constructed are not sufficient to drain thoroughly the entire mass of the sliding ground and its underlying bedrock. The Water Board recognizes this condition of affairs, and, even now, has under consideration the construction of additional bedrock drains, as branches of the main tunnel, and also a system of subsurface tile drains to cover certain portions of the surface, provided later surveys afford conclusive proof of the necessity for this additional drainage work."

GEOLOGICAL NEWS LETTER

OFFICIAL PUBLICATION OF THE

April 1959 PORTLAND, OREGON

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1958 - 1959

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(See "Calendar of the Month")

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Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon at Portland Chamber of Commerce, 824 S.W. Fifth Avenue, second floor. One dollar. You are welcome.

Friday April 10 — Arnold Shotwell, Professor of Palentology and Curator of the Museum of Natural History of the University of Oregon will be the speaker of the evening.

Friday April 24 — Vernon Newton, Petroleum Engineer of the State of Oregon, Dept. of Geology and Mineral Industry. His topic of discussion "The Petroleum Geology of Oregon."

Tuesday April 21 — Library night at Lewis and Clark College. A display of interesting books, pamphlets and historical material from our own library. If you possess rare or unusual publications, bring them along for display.

Saturday April 25 — Camp Hancock Benefit tea, 2 to 4:30, Geology lab., Lewis and Clark College. An opportunity to see the campus and its many interesting flowers, shrubs and trees. Come and help support Camp Hancock.

OLD SUMMER TIME! WHAT'S NEXT?

The annual picnic at Mt. Tabor Park, August 14, 1959, 6:30 p.m.

TEEN-AGE AND FAMILY SCIENCE CAMP APPLICATIONS AVAILABLE

Camp Hancock, the Museum's teen-age science camp, will again be in operation this year. The dates are June 21 to August 2 with three two-week sessions. Camp Arago, the family camp which was so successful last year, will be operated for two one-week sessions the end of August. Museum members wishing to go to either of these camps should apply immediately.

DON'T FORGET! JUNIOR MUSEUM MEMBERS MAY JOIN CLUBS IN ANY OF THE FOLLOWING:

SLIDE RULE - HAM RADIO - INDIAN LORE - GEOLOGY - ROCKETS.
Museum members admitted free. Phone the Museum for details.
Taken from Science Center News

NEWS OF MEMBERS

Mrs. Clara Simon, mother of Leo Simon, passed away on March 18th. The Society wishes to express its sympathy to the bereaved family.

N. B. St one, Jr., son of our Norris Stone, is now in Los Angeles working on TV scripts. He is the author of "Pasadena Caper", the story on 77 Sunset Strip over KGW-Tv on Friday.

Lloyd Ruff announces a work trip to Camp Hancock in May. Be alert for further notice.

PROPOSED HANFORD TRIP -- April Excursion

According to present plans the trip to Hanford will be made on the week-end of 18-19 April. The trip will be by bus with a round trip fare of approximately $10.00. Inquiry is being made to see what wholesale accommodations we can get. We may be able to materially reduce the cost of the overnight stop.

Mr. Randall Brown and his colleagues will act as our guides after we reach Hanford. Randall has planned an excellent itinerary for us. Excerpts from his letter propose the following: "The tour could begin at the Priest Rapids Dam on Saturday afternoon. Structures in the basalt

PROPOSED HANFORD TRIP -April Excursion (cont.)

are there well exposed and the stratigraphy well worked out. The trip could then continue past the west side of the Hanford project over Umptanum Ridge, Yakima Ridge, and the Rattlesnake Hills structure. This is the area we have been intensively mapping, and where we can point out beds of the Lower Ellensburg formation, fossil wood localities, artesian well locations (and the geologic features causing the artesian flow), and ice-rafted erratics deposited up to 1150 feet above sea level in the basin.

The White Bluffs of the Ringold formation can also be seen from many localities west of Hanford, and that formation can be fitted into the geologic sequence.

We can also point out the site of the Standard Oil Co. of California test well on the Rattlesnake Hills, the Rattlesnake Hills gas field areas, typical Lake Lewis (Touchet) sediments, and recent ash deposits that were probably derived from Glacier Peak 6800 years ago.

A second shorter tour could be made on Sunday, if desired, to the White Bluffs and the Ringold formation exposures. Some time could be spent prospecting for fossils in the more favorable localities.

The deadline for signup with Franklin Brown is 4 April. The bus will start loading at the Trailways depot at 6:45 AM, 18 April, and will leave 7:00 AM sharp. The bus route will be by way of The Dalles, Goldendale, and Toppenish. We will contact Randall Brown, our trip leader, at Toppenish. Bring a lunch for the noon meal of the 18th.

We were unsuccessful in trying to secure large scale lodgings for the group, but we will send an advance scout to line up individual lodgings, if enough people ask for it.

Paul W. Howell, President.

DR. ARTHUR A. ALLEN

EAST AND WEST FROM HUDSON BAY - Monday, April 27, 1959

Arthur A. Allen, distinguished professor of Cornell University, Ithaca, New York, captures sight and sound of bird life in Labrador, Hudson Bay tundra and Yukon delta. Puffins, guillemots and red-throated loons; ptarmigan and golden plover, dowitchers and godwits; whistling swans, emperor geese and long-tailed jaegers; strange songs and wild calls of the arctic summer. Share in the first discovery of a nest long sought by ornithologists. Exciting exploration for everyone.

BRACHIOSAURUS

The Smithsonian Institution has recently placed on exhibit in Dinosaur Hall of its Natural History Building one of the largest dinosaur limb bones ever known. It is the humerus (upper arm bone) of the sauropod dinosaur Brachiosaurus altithorax, and it was discovered by D. E. Jones, of Delta, Colo., who presented it to the Smithsonian. Geologically speaking, it is from the Morrison formation, of late Jurassic age (about 130 million years ago), in Montrose County, Colo. The bone is 6 feet 10 inches long.

According to Smithsonian paleontologists, Brachiosaurus was a giant among dinosaurs, much larger than the familiar Brontosaurus; it may have weighed as much as 55 tons. It is distinguished from other dinosaurs by the fact that its front legs were somewhat longer than its hind legs. This feature, the great length of the neck, and the projecting nostrils on top of the head seem to have been adaptations to its presumed life habits. Brachiosaurus was a plant-eater that walked along the bottoms of lakes, lifting its head to breathe above the surface of the water. Brachiosaurus is known from North America, Africa, and Europe.

Smithsonian Institution

THE SURFACE OF THE BASALT SERIES IN THE PASCO BASIN, WASHINGTON

By
R. E. Brown
and
D. J. Brown

INTRODUCTION

The Pasco Basin is the present and long-standing structural and topographic lowpoint in the Columbia Basin region, the Washington part of the Columbia River plateau. Into the Pasco Basin now flow the centripetal drainageways of the Columbia, Snake, Yakima and Walla Walla Rivers, joining within 15 miles or less of Pasco, just south of the present basin center. The Columbia River, which has flowed through the general area for at least several million years, now enters the basin through passes in the Frenchman Hills and the Saddle Mountains, leaves the basin in a narrow defile at Wallula Gap through the Horse Heaven Hills, enters the state of Oregon and turns westward toward the Pacific Ocean. The present Pasco Basin centers north of the junctions of the above-mentioned rivers, within the confines of the Hanford Works of the Atomic Energy Commission. The communities of Pasco and Kennewick lie near the junctions of the four rivers, whereas Richland, the headquarters of the General Electric Company and the Atomic Energy Commission at the Hanford Works, lies a short distance north of the junction. (Figure 1 -- Anticlinal ridges in south-central Washington).

Because of its strategic geologic location, the Pasco Basin is the key area for the solution of many of the geologic problems of eastern Washington. The study of that basin by geologists of the General Electric Company is of fundamental scientific interest, but more importantly is directly related to the program of the disposal of liquid radioactive wastes to the ground there and in assuring the continued safe and economic disposal of those wastes. The movement of ground waters and at least potentially contained wastes is definitely influenced by the basalts, either through the overlying sediments that have been deformed with those basalts, or where the basalts themselves rise to and above the ground water table.

Detailing of the geologic features of the Pasco Basin area is hampered, for within the heart of the basin the basalts are downwarped to a now-known maximum depth of about 200 feet below sea level and are covered by a complex assemblage of later fluvial, lacustrine, eolian, glacial outwash and scabland gravel deposits, with few surface exposures of any but the latest deposits. Only on the margins of the basin do the basalts crop out extensively. Previous geologic studies were limited to these perimeter areas without serious attempts to define the sequence, form or structure of the basalts or surficial sediments in the basin center.

REGIONAL SETTING

The present Pasco Basin is encompassed on the north, south and west by the east-west to northwest-trending anticlinal ridges of the Saddle Mountains, Umtanum Ridge, Yakima Ridge, Rattlesnake Hills and the Horse Heaven Hills. These structures plunge toward the east and southeast and with the exception of the Horse Heaven Hills die out near the basin center and are superseded by the gently rising basalt plateau that continues to the Idaho-Washington border, the Lewiston Basin and the Blue Mountains. The Pasco Basin is thus the focal point of the downwarping of the basaltic lavas and the transition zone between the terminating anticlinal ridges and synclinal valleys extending eastward from the Cascade Range, and the gently westward and southwestward-dipping basaltic lava flows of eastern Washington.

The basalt flows of the vast Columbia River basalt series constitute the bedrock of the region. Wells drilled in the region and stratigraphic data upstream from Priest Rapids (Twiss, 1933; Mackin, 1955) indicate the series exceeds 4000 feet in thickness and probably several thousand feet more. They may well comprise the thickest part of the entire basalt plateau. (Figure 2 -- Geologic columnar section, Pasco Basin Area).

The oldest rocks exposed and recognized in the basin area are the Yakima basalts, originally described by G. O. Smith (1903) from a local section of lava in the Yakima-Ellensburg

region. Above the Yakima basalt lies a heterogeneous assemblage of sedimentary rocks consisting predominantly of torrentially stratified volcanic tuffs, pumice lapilli, conglomerates and related rocks known as the Ellensburg formation, and derived from the then-rising Cascade mountains to the west. A thin basalt member, intercalated in the lower part of the Ellensburg formation, was named the Wenas basalt by Smith (1903, a, b) from the same general type locality.

The age of extrusion of the Yakima and Wenas basalts and the deposition of the Ellensburg formation were first indicated by Smith to be Miocene, but later work has rather consistently modified the age upward so that much if not all the Ellensburg beds and intercalated and associated flows may be Pliocene in age (Waters, 1955).

Of the bedrock formations in the Pasco Basin Area, the Ellensburg formation is most important, for in many locations its beds form the confining horizon for the artesian aquifers occuring within the immediately underlying basalt flows in the synclinal valley areas -- those areas in which agriculture is otherwise most practicable.

Above the uppermost beds of the basalt series lies the Ringold formation, the Palouse soil, the Touchet sediments and fluvial and scabland gravel deposits of Pleistocene to immediately post-Pleistocene age.

DATA CONTRIBUTING TO BASALT CONTOUR MAP

The primary data used in the compilation of the contour map of the basalt surface were the records of the nearly 100,000 feet of wells drilled in and about the Hanford Works in conjunction with the program of disposal of liquid radioactive wastes to the ground there. About 60 water supply wells of the several hundred drilled in the Columbia Basin Irrigation Project east of the Columbia River, and totalling more than 30,000 feet in depth provided abundant data. To these data were added the results of field mapping in the basin environs and where basalt was exposed within the basin itself. Controls more precise than simple projection of the contours or structures were discovered by McConiga and Brown (report in preparation) who found conclusive evidence of the tectonic deformation with the basalts, of the Ringold formation. Recognition of a detailed stratigraphic sequence in that Ringold formation accordingly permitted relatively precise determinations of the depth to and attitude of the basalt where wells penetrated only into indentifiable horizons of the Ringold formation.
(Figure 3 -- Geologic cross-section, Pasco Basin Area, Washington).

Erosion has locally modified the basalt surface, most prominently the crests of the ridges, and most significantly the Gable Butte-Gable Mountain portion of the Umtanum Ridge fold, the southeastern extension of the Saddle Mountain structure where transected by the Ringold (Koontz) Coulee, and the Yakima River section of the Yakima Ridge fold. In addition, the present water gaps through the Saddle Mountains, Rattlesnake Hills and Horse Heaven Hills attest to that erosion. In no yet-known instance does this so modify the structures that they vary appreciably from the outlined ridges. The basalt surface map, for practical purposes, closely approximates a structure map.

The depth to basalt ranges up to about 650 feet in the west central part of the Hanford project and in the White Bluffs. The surface of the Columbia River lies about 340 feet above sea level at Wallula Gap and about 400 feet above sea level at Priest Rapids. The shaded area on Figure 4 shows all areas covered by roughly 50 feet or more of surficial materials. (Figure 4 -- Contours on the surface of the basalt series, Pasco Basin Area, Washington).

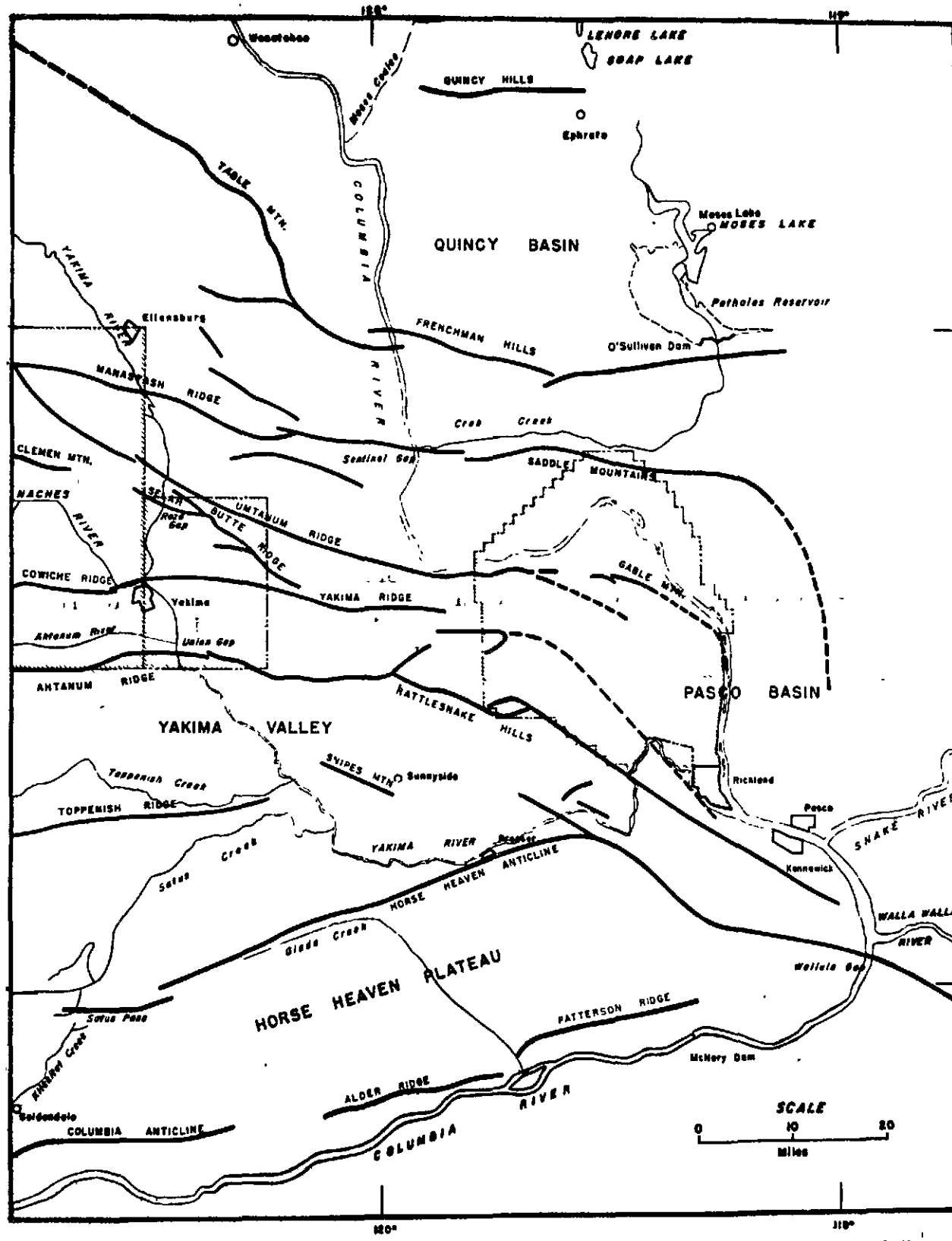
THE ANTICLINES AND SYNCLINES

The northernmost structure of the basin is the Saddle Mountain anticline, a major structure trending nearly east-west to a point north of Richland where it passes beneath the overlying Ringold sediments and gradually swings southeastward until it loses its identity in the gently westward-dipping basalts northeast of Pasco.

Structural control of the Esquatzel Coulee by the Saddle Mountain anticline is also demonstrated and confirms the extension of the structure. Initial erosion of the coulee up to four miles west of Eltopia was followed by an eastward shift of the meltwater stream, down the dip of the basalt surface. Entrenchment of the coulee near the axis of the local syncline east of the Saddle Mountain structure followed, leaving the partly planed basalt surface as a bench southwest of Mesa, west of Eltopia and north of Jackass Mountain.

South of the Saddle Mountains is the Wahluke syncline, named for the Wahluke Slope, the southern

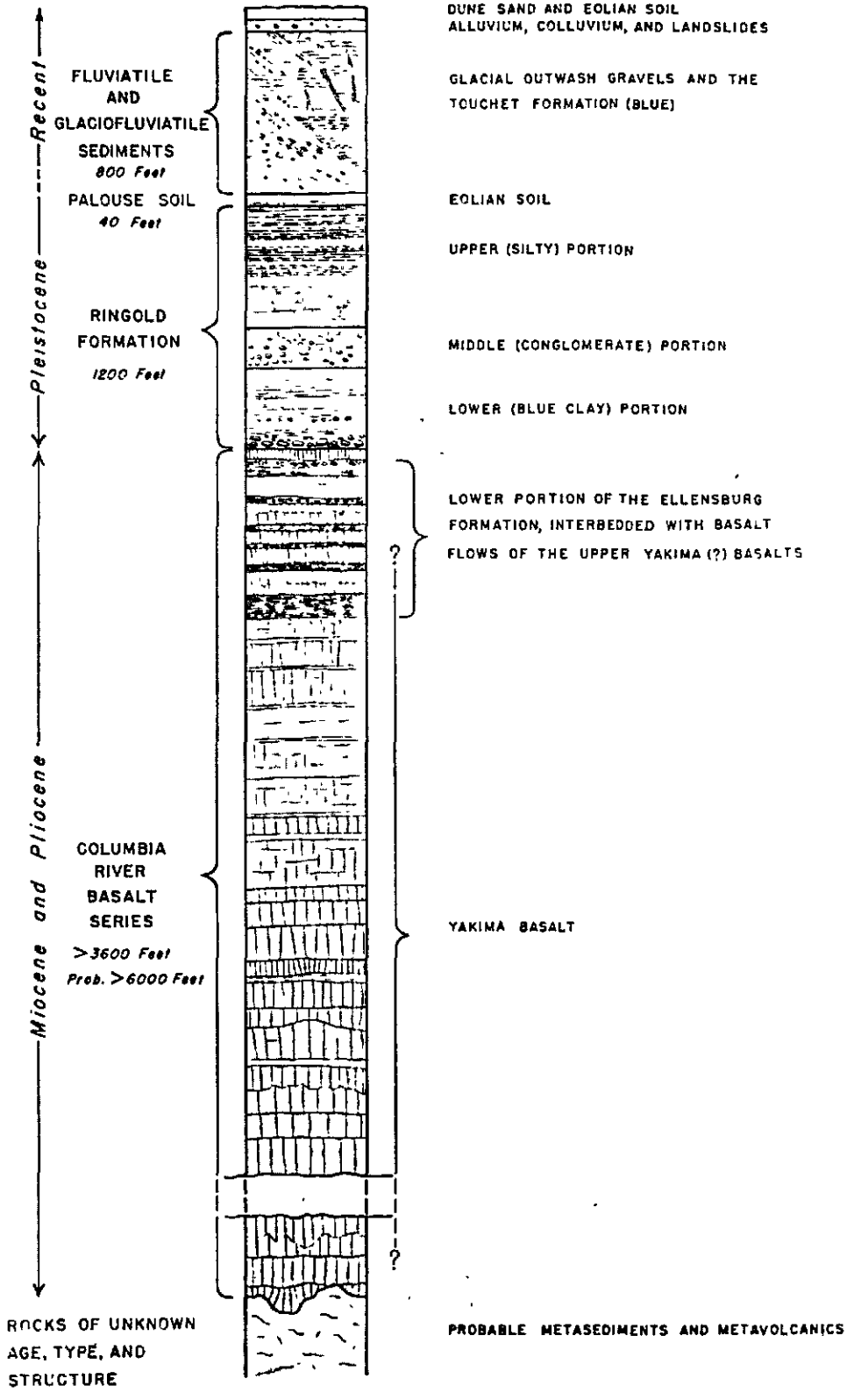
ANTICLINAL RIDGES IN SOUTH-CENTRAL WASHINGTON



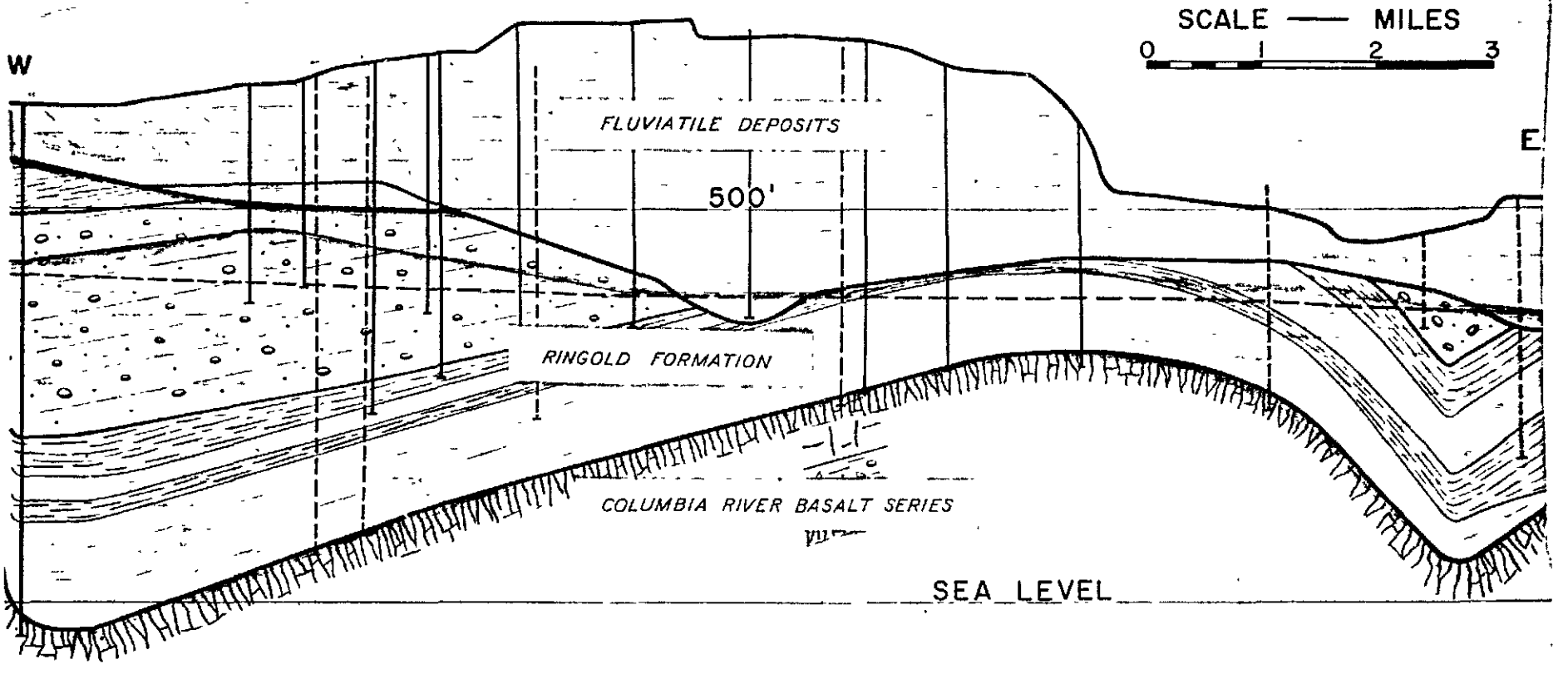
Modified from Waters and others

GEOLOGIC COLUMNAR SECTION

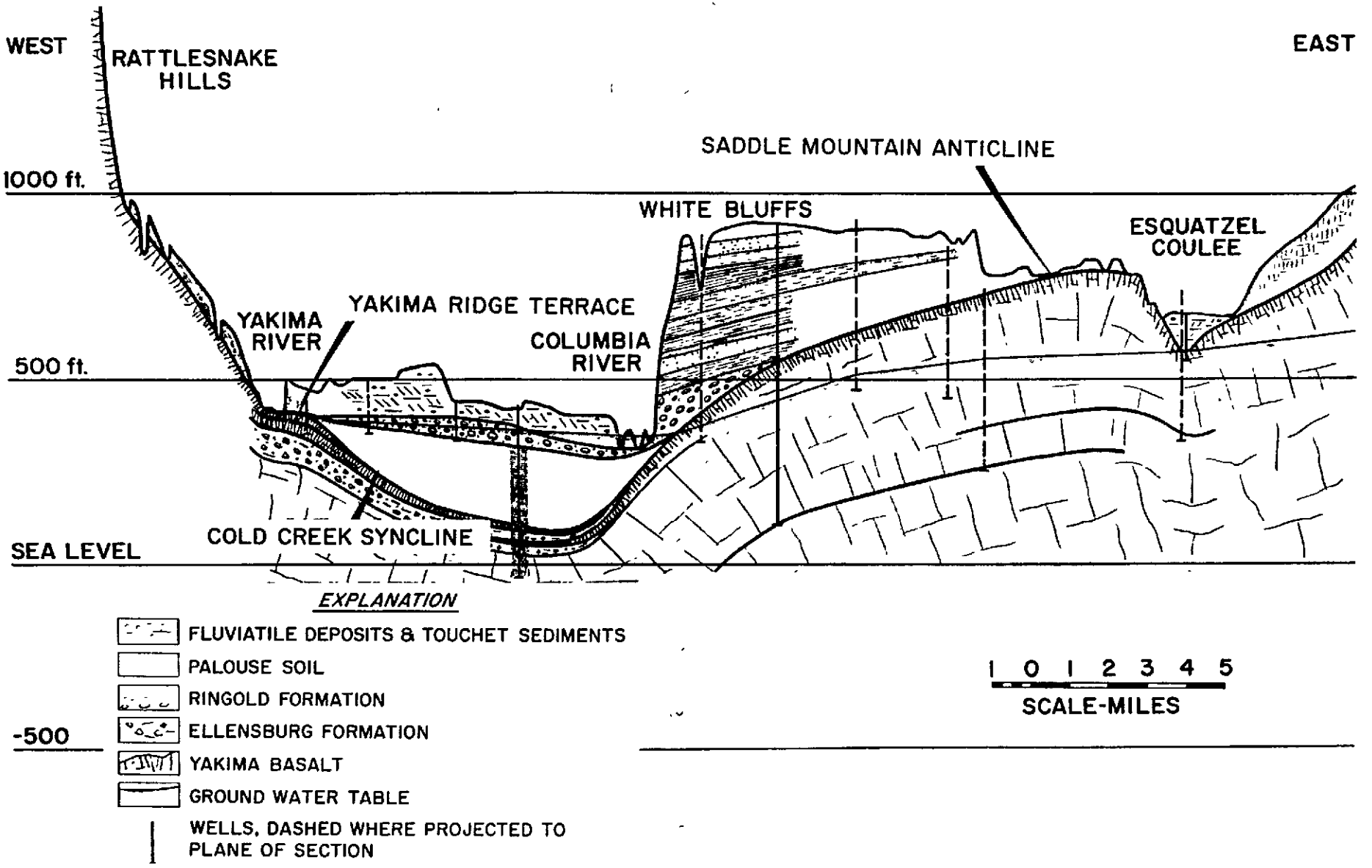
PASCO BASIN AREA

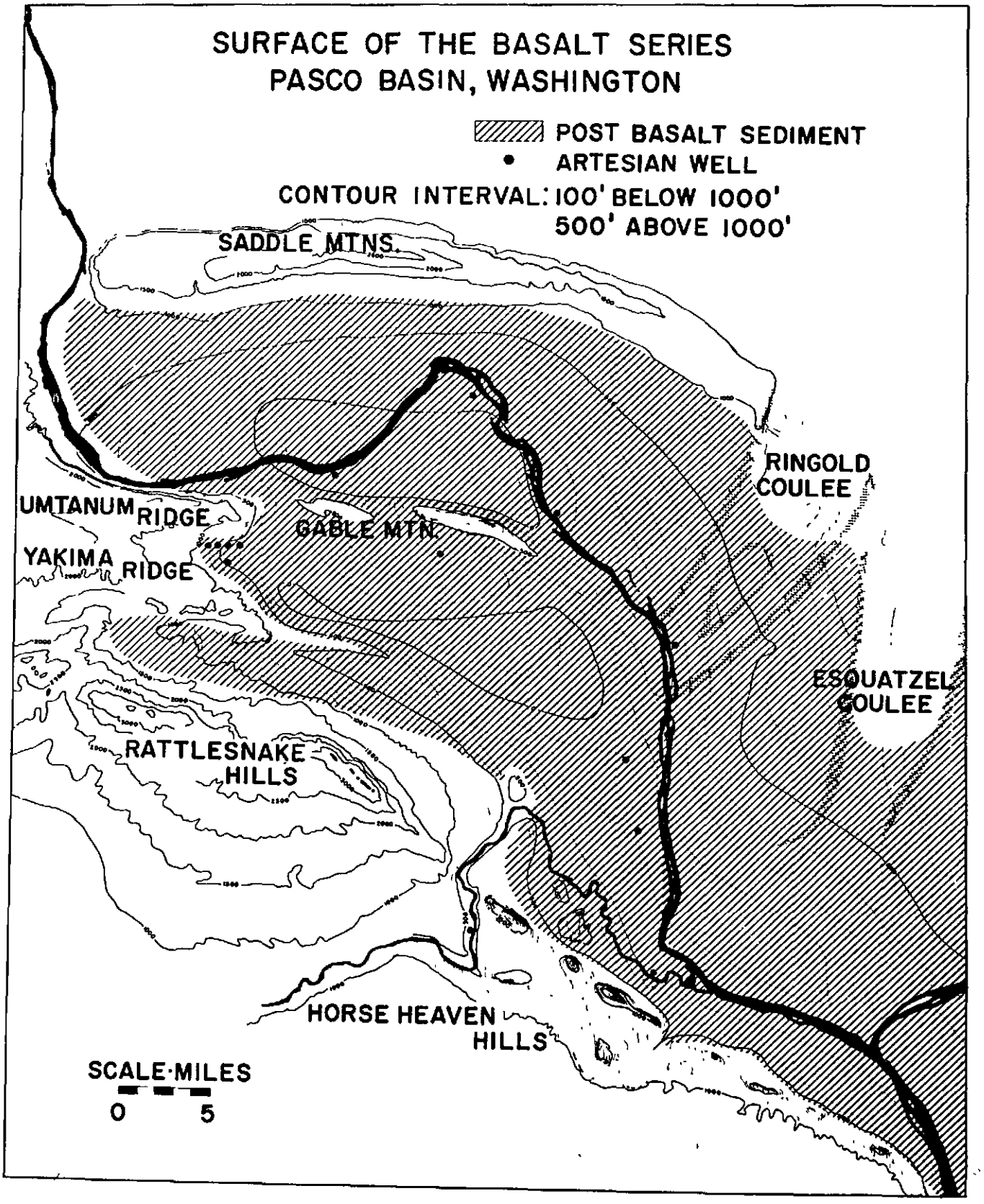


GEOLOGIC CROSS SECTION - HANFORD WORKS AREA



GEOLOGIC CROSS-SECTION, PASCO BASIN AREA




SURFACE OF THE BASALT SERIES
PASCO BASIN, WASHINGTON
POST BASALT SEDIMENT
ARTESIAN WELL
CONTOUR INTERVAL: 100' BELOW 1000'
500' ABOVE 1000'
SADDLE MTNS.
RINGOLD COULEE
UMTANUM RIDGE
GABLE MTN.
YAKIMA RIDGE
ESQUATZEL COULEE
RATTLESNAKE HILLS
HORSE HEAVEN HILLS
SCALE-MILES
0 5

slope of the Saddle Mountains. The syncline dies out southeastward at the apparent confluence of the Saddle Mountain anticline and the Umtanum Ridge anticline.

South of the Wahluke syncline is the Umtanum Ridge-Gable Mountain anticline, nearly bisecting the Pasco Basin. Erosion by the Columbia River locally has modified appreciably this cross-basin structure during several different periods that evidently include (1) the period of initial rise of the Umtanum Ridge anticline that apparently diverted the Columbia River eastward around that ridge to a structural low point, (2) the period following superposition from the top of the Ringold fill, (3) the period following superposition from the top of the fluvial-Touchet fill.

Faults are not readily evident along this structure, in spite of the steep scarps bordering the mountain ridge, nor have faults of appreciable displacement been detected to date. This accordingly supports the early work of Smith (1903 a, 1903 b, 1903 C) who vigorously contested the fault-block theory of still earlier workers and advanced the concept that the ridges owe nothing of their height and straightness to faulting, but rather entirely to folding. Mackin however recognized an apparently significant fault in the Priest Rapids area which he named the "Umtanum thrust fault", but the fault is in part a bedding plane slip and is of undemonstrated displacement.

Near Gable Butte a west-northwest alignment of basalt high points is evident, paralleling the indicated southeastward extension toward Ringold of the Gable Mountain anticline. This lineation may represent, (1) en echelon west-northwest-trending folds as also suggested by Hammer (1934) but not yet clearly defined by detailed geologic mapping of the area, (2) the repetition of the stratigraphic sequence as the result of movement along east-west-trending faults through the locally southward-dipping basalts, (3)extremely sinuous anticlinal and synclinal axes, (demonstrated present in the Gable Mountain area together with a reversal of the asymmetry of that ridge), (4) the result of erosion of the basalt ridge by the Columbia River, perhaps controlled in part by cross-folds or cross-faults. The steep north scarp suggests a fault scarp, however detailed geologic mapping discloses sharp folding sufficient to create the scarp without the necessity of fault movement or significant bedding-plane slip. Adjustment resulting from sharp folding has occurred elsewhere along the many joint planes in the basalt such that no well-defined fault plane or zone is necessary. Similar conditions were noted by Waters in the Yakima East quadrangle.

The Gable Mountain structure continues southeastward toward Ringold, the type locality of the Ringold formation. Here the local eastward dip of the Ringold beds reflects a change in the attitude of the basalt, and combined with the logs of deep wells to the east suggests a southward swing of the anticline parallel to the already noted swing of the Saddle Mountain fold.

South of the Umtanum Ridge-Gable Mountain fold lies the Cold Creek syncline, traceable from the Yakima East quadrangle to and beneath the Hanford project and to a depth exceeding 150 feet below sea level south of the east end of Gable Mountain. The syncline parallels the farther north structures, swings southeastward beneath the Columbia River north of Richland and passes beneath Pasco. It there swings eastward again past the south end of the Saddle Mountain anticline, parallels the Walla Walla River valley along the north escarpment of the Horse Heaven Hills and becomes the Walla Walla syncline of that region.

South of the Cold Creek syncline lies an ill-defined and discontinuous anticline that is the southeastern continuation of Yakima Ridge. Throughout the confines of the Hanford project it lies close to but generally beneath the ground surface until it crops out as a line of isolated hills paralleling the Yakima River on its west bank above its confluence with the Columbia River. The structure throughout much of its course beneath the Hanford Project is a structural terrace on the north limb of the Rattlesnake Hills anticline, however details are lacking owing to the paucity of exposures and to the amount of erosion and later deposition of sediments that have obscured the details of the structure along the Yakima River.

Dry Creek Valley is a local synclinal valley of short extent, limited to the extreme western edge of the basin and which dies out between the Rattlesnake Hills anticline and the Yakima Ridge structural terrace.

The most prominent structural features of the Pasco Basin include the Rattlesnake Hills anticline, the Yakima Valley syncline, and the Horse Heaven Hills anticlinal structure, forming the region's most accessible major topographic features. The Rattlesnake Hills anticline, at one time a producer of natural gas, has been studied repeatedly locally, but overall only in a reconnaissance manner (Culver, 1926; Daly, 1934, 1936; Hammer, 1934) although in greater detail in the Yakima region. The Yakimg Valley and the Horse Heaven Hills, although important agricultural areas and hence more accessible, similarly have been studied in only desultory or reconnaissance fashion. Recent interest in the region by major oil companies has resulted in a

more thorough geologic study and in the test drilling of a well on the Rattlesnake Hills structure by the Standard Oil Company of California.

ARTESIAN AQUIFERS IN THE BASALTS

Artesian water has been found in most synclinal areas within the basalt series. Wells encountering such artesian conditions are indicated on the basalt contour map, thus further supporting the structural and physiographic similarity of the surface of the basalt. Wells drilled in the Wahluke syncline on Wahluke Slope to adequate depths (greater than 1000 feet) and wells drilled on the project itself, in some cases only to the basalt and through the overlying impermeable blue clays of the lowermost Ringold formation, have demonstrated significant artesian pressures. Indicated flow rates are not great, however, at least for continuous well operation.

The Cold Creek syncline contains the most extensive, known artesian conditions of the local structures. About 5 wells west of the Hanford Works have for many years produced water from a depth of about 650 feet. Several wells near the southeastern corner of the restricted area similarly encountered artesian conditions in or directly above the basalt beneath conformable impermeable clays of the lower Ringold beds. Wells within the Yakima Valley have shown variable artesian pressures, however the main problem there, as in the Hanford Works area itself, is the difficulty of adequately correlating between such wells to satisfactorily determine the precise stratigraphic horizons producing the artesian waters, hence the extent of those horizons and the available quantity of water. With few exceptions, data now at hand suggest rather limited artesian aquifers of limited though useful production capabilities.

REGIONAL PATTERN

The major basalt structures adjacent to and beneath the Pasco Basin demonstrate a curious southeastward trend from the east-west trend noted by earlier workers and convergence in an area lying in the vicinity of the junctions of the Columbia, Snake, Yakima and Walla Walla Rivers. The convergent trend is not solely within the Pasco Basin, however, but is indicated west of the Pasco Basin area by Waters and is also shown on the Tectonic Map of the United States. The anticlines in the Horse Heaven plateau area trend from east by north to east-northeast, those in the Yakima Valley and including Toppenish Ridge, Rattlesnake Hills and Yakima Ridge trend from east by north to east by south, and those lying farther north, including Selah Butte Ridge, Umtanum Ridge, Manastash Ridge and Table Mountain (the westward extensions of the Saddle Mountains and Frenchman Hills, respectively) trend from east by south to nearly southeast.

The generally eastward trend of the structures changes to a general southeastward trend toward the east in the Pasco Basin area. The trend change is evidently closely linked to the formation of the Pasco Basin. Continuation of the present studies to more precisely reveal the detailed structures of the defined folds can further resolve the problem. The difficulty in the solution of these problems, owing to the buried nature of the data, can be more rapidly and readily resolved by the use of geophysical seismic techniques, planned for the future at the Hanford Works.

REFERENCES CITED

Culver, H. E , 1926, Abstract of the report (by Solon Shedd) on the geology and resources of the Pasco and Prosser quadrangles (Washington) -- Washington Div. Geology, Rep't. Investigations No 1.

Daly, M. R., 1930, "The Search for oil as applied to Washington"--Washington Oil World, v. 1, No. 3-7. See also 1934, Northwest Oil and Gas World, V. 4, No. 6-11.

1936, "A geological report on the Rattlesnake Hills field, Washington"--Northwest Oil and Gas World, v. 6, No. 3, 4, 5.

Hammer, A. A., 1934, "Rattlesnake Hills gas field, Benton County, Washington" --Am. Assoc. Petrol. Geol. Bull 18, p. 847-859.

McConiga, M. W., and Brown, R. E., (Report in preparation), "Deformation of the Ringold Formation".

REFERENCES (continued)

Mackin, J. H., 1955, "Geology of the Priest Rapids development " -- Priest Rapids Hydroelectric Development, Columbia River, Washington, v 3, Grant County Public Utility District.

Smith, G O , 1901, "Geology and water resources of a portion of Yakima County, Washington"-- U.S. Geol. Survey Water Supply Paper 55,

1903 a, "Geology and physiography of central Washington"--U.S Geol. Survey Prof. Paper 19.

1903 b, "Description of the Ellensburg quadrangle (Washington)" U.S. Geol Survey Geol. Atlas, Ellensburg Folio (No. 86).

1903 c, "Anticlinal mountain ridges in central Washington"-- Jour. Geology, v. 11, p. 166-177.

Tectonic Map of the United States (1944) -- Am. Assoc. Petroleum Geologists, Tulsa, Okla.

Twiss, S.N., 1933, "Stratigraphy of Saddle Mountains"-- unpublished M.S. thesis, State College of Washington, Pullman.

Waters, A C., 1955, "Geomorphology of south-central Washington, Illustrated by the Yakima East quadrangle"--Geol. Soc. America Bull., v. 66, p. 663-684.

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CONDON LECTURES

Portland State - April 14 and 16

Sir Wilfred Clark of Oxford University, England, will speak to confirm the Darwin Theory which was first published just 100 years ago.

Members of our Society are welcome.

There will be no admission charge.

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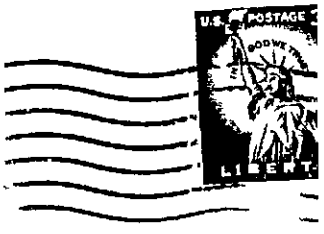
GEOLOGICAL NEWS LETTER

OFFICIAL PUBLICATION OF THE

May 1959 PORTLAND, OREGON



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Society Objectives

To provide facilities for members of the Society to study geology, particularly the geology of the Oregon Country; the establishment and maintenance of a library and museum of geological works, maps, and specimens; the encouragement of geological study among amateurs; the support and promotion of geologic investigation in the Oregon Country; the designation, preservation, and interpretation of important geological features of the Oregon Country; the development of the mental capacities of its members in the study of geology; and the promotion of better acquaintance and closer association among those engaged in the above objectives.

Persons desiring to become members should contact the Membership Chairman, Mrs. William F. Clark, 3613 S. E. 9th Avenue, Zone 2, Phone: BE4-7096. Regular annual dues (single or family memberships) are $5 for residents of Multnomah and adjacent counties $2.50 for others; and $2 for Junior Members. Make remittances payable to the GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Society Activities
(See "Calendar of the Month")

Evening Meetings: Formal lectures or informal round-table discussions on geological subjects, on the second and fourth Fridays of each month at Public Library Hall, S.W. 10th Avenue and Yamhill.

Field Trips: Usually one field trip is scheduled for each month.

Library Night: Once a month. Lewis and Clark College.

Luncheons: Informal luncheons, with geological motif, each Thursday noon in Room B, Chamber of Commerce Building, S.W. 5th Ave. and Taylor St $1.00 per plate.

Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon at Portland Chamber of Commerce, 824 S.W. Fifth Avenue, second floor. One dollar. You are welcome.

Friday May 8	Camp Hancock Program. Lon Hancock will speak on Paleontology; Lloyd Ruff will speak on Geology; and Douglas Burns will speak on Biology, Botany and Zoology. They will each make short talks about the Clarno country.
Tuesday May 19	Library night. Picnic at Lewis & Clark College - 6:00 p. m. - followed by library browsing and evening program.
Friday May 22	Movie, "Unchained Goddess", a Bell Telephone film. Runs one hour, w/color and sound. The story of weather.
Sat. & Sun. May 23 & 24	Field Trip - Camp Hancock. Meet at Camp Hancock as a year ago. There is necessary work to be done in preparation for summer classes. Bring hammer and shovels, camp gear and rain clothes. This is a joint venture with the Agate and Mineral Society. Your help will be greatly appreciated.

BANQUET HIGHLIGHTS

HEAVENLY DAZE

When the skit, Heavenly Daze, came on at our annual banquet, even though one of the actors masqueraded behind a hundred years' growth of Centennial beard and gave the almost incomprehensible name of Leo Andesite de Roc. we had no trouble in recognizing one of our own members. It was just Leo Simon, up to his old tricks.

Having (deservedly) been conked on the head with a beer bottle by Johanna, Leo deserted this earthly sphere, and hied himself straight to the pearly gates. Arriving there unexpectedly, with no advance reservation, and finding the quota of geologists full up (that sounds fishy), it looked for a time like said de Roc would have to spend an eon or two in limbo.

St. Peter, played very convincingly by Bill Clark, was caught napping with his feet on the desk, however, he quickly bestirred himself and started checking up on the heavenly aspirant. Leo lost no time in putting pressure on St. Peter with, as usual, a very underhanded scheme. During a long-winded argument, he tricked Pete into giving him ten minutes--just ten minutes, inside with the said resident geologists. That's all it took.

What Leo told them, no one knew, but their heavenly berths were quickly vacated. Like prisoners on a jail break, the said geologists (?) poured out---scarcely taking time to shed their heavenly habiliments, ran to the jumping-off place, and jumped. First, Franklin Brown. . in too big a hurry to explain. . next Irving Ewen, likewise in a big rush, and finally, Lon Duffledorfer Hancock, even though he'd had a lot of trouble learning to fly with his heavenly wings, couldn't be detained. . . he had business below, but urgent.

It was all explained when De Roc (ne Leo) admitted he had told the three geologists of a rumor he'd heard; the discovery of a new fossil field down in the nether regions. Unfortunately, however, he made the story a little too strong, and thus fell a victim to his own rascality He began to believe it himself, consequently, he, too, took off to investigate, followed quickly by St. Peter himself, who, after having been exposed to a few fossils, naturally wanted to get into the act.

All was not left askew in the heavenly realm, however, for one of the angels, Dick Brown, complete with wings, crown and harp, took over the celestial duties of the office deserted by Pete, and all ended happily.

The skit was instigated by Jane Erickson, embroidered by the various actors participating, satisfactorily sewed up by Ardna Brown, Eleanor Pierce and Catherine Clark, and a good time was had by all, especially the audience.

Next week: East Lynne

MORE ON BANQUET -

PRESIDENT STAUFFER RETIRES

"When I began to think about a subject for this talk I asked myself if there was one word that would adequately express my feeling toward the Geological Society of the Oregon Country. In fact, I could not get to sleep one night, thinking about this. until suddenly the word "Hurrah!" came to mind, and I at once recognized that I had reached a solution. However, after I had given this word to the chairman of the banquet committee as the title for my talk, I began to have misgivings. Would not some people think that I was rejoicing at having come to the end of my term of office? I would like to state that this not the case. It is true the office has many responsibilities but is also a source of a great deal of satisfaction, and I can truthfully say that the position involves less actual work than that done by some of the committee members and others.

I would like to say a loud hurrah not only for the society and its various activities but also for the Oregon Country and the opportunities it offers for recreation and study. Few areas of the earth can equal it and none surpass it in natural endowments, including that great desert state to the south of us. Considering the age of the society I remember a cartoon in which a wife remarked with petulance to her husband, "Don't tell everyone we have been married for a quarter of a century, say it has only been for twenty-five years." The society is now almost a quarter of a century old and it owes its stability to the foresight of its founders, to the many devoted members who have nourished it and to the spirit of good will that animates it. To remain alive it must progress. It must have programs with so much appeal that people will be eager to join it and to participate in its activities.

The Oregon Country is a great deal older than the society and is one of its chief reasons for its being. This being true we owe it to the future to do everything in our power to prevent the Oregon Country from being despoiled by the encroachment of various interests that would reduce her wilderness areas, flood her state parks, and mar her scenery. To publicize her wonders I would like to see the society promote the establishment of more geological markers, describing some of our geological formations such as the Columbia River Basalts for which Oregon is known around the world. Most of all I would like to see the society further assist Camp Hancock, probably the most unique institution of its kind found anywhere on the earth. It has proven its stability but it needs a financial campaign for new buildings and scientific equipment. I would like to reserve one of my loudest hurrahs for Camp Hancock and for its founders, Lon and Berrie Hancock.

Finally, I would like to give a big hurrah for the chairmen of our committees, for our officers, for those who have helped with the annual picnic, with this banquet, with library night, with field trips and with the news letter. I wish I might name each one of them and tell how each did his work faithfully and well, but time does not permit. I am grateful for the most excellent cooperation I have had.

It is now my great pleasure to introduce our new president, Paul Howell, a member of the geological staff of the Corps of Army Engineers, has demonstrated by what he has written for the News Letter, by talks before the society and by field trips that he has conducted, that he has a profound knowledge of the geology of the Oregon Country and a deep interest in the welfare of the society. I am happy to turn over to him Thomas Condon's book, "The Two Islands" and this mallet as symbols of the office of president and to wish him success in his undertakings in behalf of the society."

--- A MASTERFUL PRESENTATION

There are people who like to hear their own voices even when joined in community singing with scores of accomplished vocalists; and there are some who derive their main pleasure from foods. But there are also many others who are not able to carry a tune in a bushel basket, or who are limited in their choice of foods by a table of calories. It is our firm conviction, however, that the great majority of those present at the G. S. O. C.

(A MASTERFUL PRESENTATION - cont.)

annual banquet got their greatest pleasure of the evening from Al Keen's illustrated description of his trip among the colorful water- and wind-eroded canyons, arches and monoliths in southern Utah and northern Arizona.

No matter how eloquent the speaker, words alone can carry no more than a vague impression of that unique display of Nature's handiwork, so Al brought to the meeting a selection from his colored slides, which, as a result of his painstaking selection of points of view, showed to his audience the most interesting and artistic aspects of those marvelous carvings, done by the oldest of artists, Water and Wind.

Many thanks, Al Keen, for again calling to mind this wonderful heritage which all may enjoy.

G. S. O. C. BANQUET SONG
(1959)

Centen -- Oregon

I want to go, to be in Oregon
To see a hundred years of Oregon
From the mountains to the sea,
Woods and rivers beckon me
Come and play all 'round in Oregon.

They've set the stage for me in Oregon
And marked the trail for me to Travel on
Where the covered wagons rolled,
Bringing pioneers so bold
To the wonderland of Oregon.

The world has sent its wares to Oregon
Gardens and arts for us to gaze upon.
Come by train or plane or car,
Come from near and come from far,
Join the fair in Oregon.

By Dr. and Mrs. Arthur Jones

DUES ARE PAST DUE ! ! ! !

Make checks to the -
Geological Society of the Oregon Country

Mail to -

Rose Hamilton
5412 S.E. Powell Blvd.
Portland 6, Oregon
Telephone: PR 5-9762

* * * * * * * * * * * * * * * * *

FRIDAY NIGHT PROGRAMS - G. S. O. C.
1958 - 1959

1958	
March 14	Annual Banquet
March 28	Leonard H. Delano - Birdseye View of some of Northwest Geological Features
April 11	Mrs. Gladys B. Hannaford - Origin, Sentiment, Trade and Uses of Diamonds
April 25	Program - 3 College students - New Madrid Earthquake, Miss Jan Elma. Oregon Geysers, Jack Williams
May 9	Orrin E. Stanley - Kitimat to Key West and Way Stations
May 23	Dr. Fred Ayres - The Cordillera Blanca
June 13	Randall E. Brown - The Surface of Basalt Series in the Pasco Basin
June 27	Painted Canyon - color film dealing with Bryce, Zion and Grand Canyon
July 11	Leo Simon and others, with colored slides. Preview of Mt. Rainier
July 25	Wallace B. Eubanks - Willamette Valley Fossil Woods
August 7	Annual Picnic - Mt. Tabor Park
Sept 12	Dr. Edwin F. Lange - Oregon Meteorites
Sept 26	Mrs. Dolores Gregory - The Geology of the Steens Mountains
Oct 10	Courtesy of Bell Telephone - Strange Case of Cosmic Rays
Oct 24	G. S. O. C. Meeting at Oregon Museum of Science and Industry
Nov 14	Orme Cheatham - Shells
Dec 12	Douglas Burns - Reptiles and Amphibians of North America from the Arctic Circle to the Tropic of Cancer
1959	
Jan 9	Lancaster Pollack, accompanied by Wm. Lambert and Robert Scranton - Recent Quest for Blue Bucket Mine
Jan 23	Paul Howell - Criteria Governing the Occurrence of World Glaciation
Feb 12	Bob Lynott - Is Another Ice Age Coming?
Feb 27	Annual Business Meeting Dave Bolin - Two Alaskan Expeditions

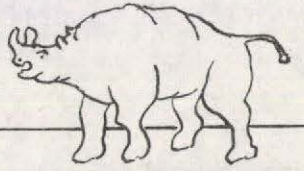
GOODBYE, ROCK HUNTERS, GOODBYE

Our banquet now is at an end
Goodbye, Rock Hunters, Goodbye.
We'll work a year and meet again
Goodbye, Rock Hunters, Goodbye.
Geodes and fossils, banquets
and wassails,
Campers with "tossles"
Goodbye, Rock Hunters, Goodbye.

* * * * * * *

TWENTY-FOURTH ANNUAL BANQUET

MARCH 13, 1959



Geological Society
of the
Oregon Country

IN THE CLARNO
(Clementine)

In the Clarno, in the Clarno
Sixty million years ago
Waved the palm trees in their splendor
Knowing neither ice nor snow

CHORUS:
Come the Geesocks, come the Geesocks
Braving wind, or rain, or tan,
You can hear their merry laughter,
It's the Clarno Caravan.

To this land of calm and beauty
Came the breath of Nature's wrath
Ashes from a fiery mountain
Covered all within its path.

Buried deep beneath this blanket
Limbs and nuts and fruits galore
Were preserved in Nature's storehouse
On an ancient lake bed shore.

Years of wind and rain and sunshine
Have uncovered them at last,
Bringing forth to those who seek them
Records of that ancient past.

To this land of sun and sage brush,
Where the fossil nuts are found
Come the Geesocks with their hammers,
Breaking rocks upon the ground.

DON'T CRY, SUZANNA

CHORUS:
Oh! Suzanna, now don't you cry for me,
I'm going out to Oregon's
Centennial for to see

1. I'll find my way to Oregon
The land out by the sea;
Now that they're putting on
a fair
It's sure the place to be.

2. I've listened long and
patiently
Beside my radio;
From what these fellows have
to say,
It must be quite a show.

3. The weather there is always
mild,
The trees are always green,
The flo-wers bloom the
whole year 'round,
Their beauty must be seen.

4. The rivers there are clear
and deep,
They've lakes of every size;
From what I hear it sure must
be
A sportsman's paradise.

5. Now if you want to dig for
gold,
Go hunt 'Blue Bucket Mine';
Pin-pointing its location
will
Take quite a little time.

6. Could be that you're a shutter
bug,
You'll find a split rail fence;
Or possibly an Indian maid
Who'll pose for fifty cents.

7. Or, if you are a novelist
And handy with your words,
Phil Brogan knows the high
plateaux
And Leo's for the birds.

8. We've heard of a Society
It's called G. S. O. C.
Let's join with them and have
some fun,
They're such good company.

9. On Labor Day there's going
to be
A Nat'nl Min'ral Fair
Of rocks and wood and
crystals, Oh!
And gems so very rare.

10. So let's all go to Oregon
Take number 30 route;
They'll make us very welcome
for
Their latch string's always out.

11. But when we're started on
our way
We'll drive with utmost care;
We know we're not like "Tabby Cat",
We have no life to spare.

Mrs. William F. Clark

BANQUET COMMITTEE

TICKETS
Mr. and Mrs. Leo F. Simon

GIFTS
Mr. and Mrs. H. Bruce Schminky

INTERPRETER (menu)
Mrs. Paul W. Howell

HOSPITALITY
Mr. and Mrs. Lloyd L. Ruff

MUSIC
Mrs. A. W. Hancock
Dr. Francis G. Gilchrist

PHOTOGRAPHY
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Mr. Jesse L. Brown

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Mrs. James Stauffer
Mrs. Franklin Brown
Mrs. William F. Clark

HOSTESSES
Mrs. Ray Golden
Mrs. Elwin Lilly
Mrs. Leslie Davis
Miss Alice Schminky
Miss Joanne Aungst
Mrs. Stephen Blore

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Mrs. Hayward Peirce

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Dr. Ruth E. Hopson	Mr. Murray R. Miller
Mr. Murray R. Miller	Dr. Ruth E. Hopson
Mr. William F. Clark	

* * * * * *

MENU

DINNER NO. 1

ROASTED ARCHAEOPTERYX WITH JURASSIC
CONGLOMERATE AND VOLCANIC MUD FLOW

OR

ICHTHYOSAUR LOAF

DIATOMACEOUS EARTH PLASMA LENTILS
VOLCANIC BOMBS
MENISPERMUM LEAVES DECKED WITH RUBIES

DREIKANTER EN CASSEROLE
LIQUID AMBER

* * * * * * * * *

DINNER NO. 2

TURKEY WITH DRESSING
AND GIBLET GRAVY

OR
SALMON LOAF

MASHED POTATOES STRING BEANS
HOT ROLLS
CRANBERRY SALAD

APPLE PIE
COFFEE OR TEA

PROGRAM

Twenty-fourth Annual Banquet

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Mrs. Delia Avery Paterson
Mistress of Ceremonies

"IN THE CLARNO". . . . . Everyone

DINNER

* * * * * * * * *

"HURRAH". . . . . Dr. James Stauffer

"SCIENCE IS A WAY OF LIFE". . . Mr. Paul W. Howell

INTERMISSION

"A GLIMPSE OF THE PRESENT WITH A PAST"
by
Mr. Albert J. Keen

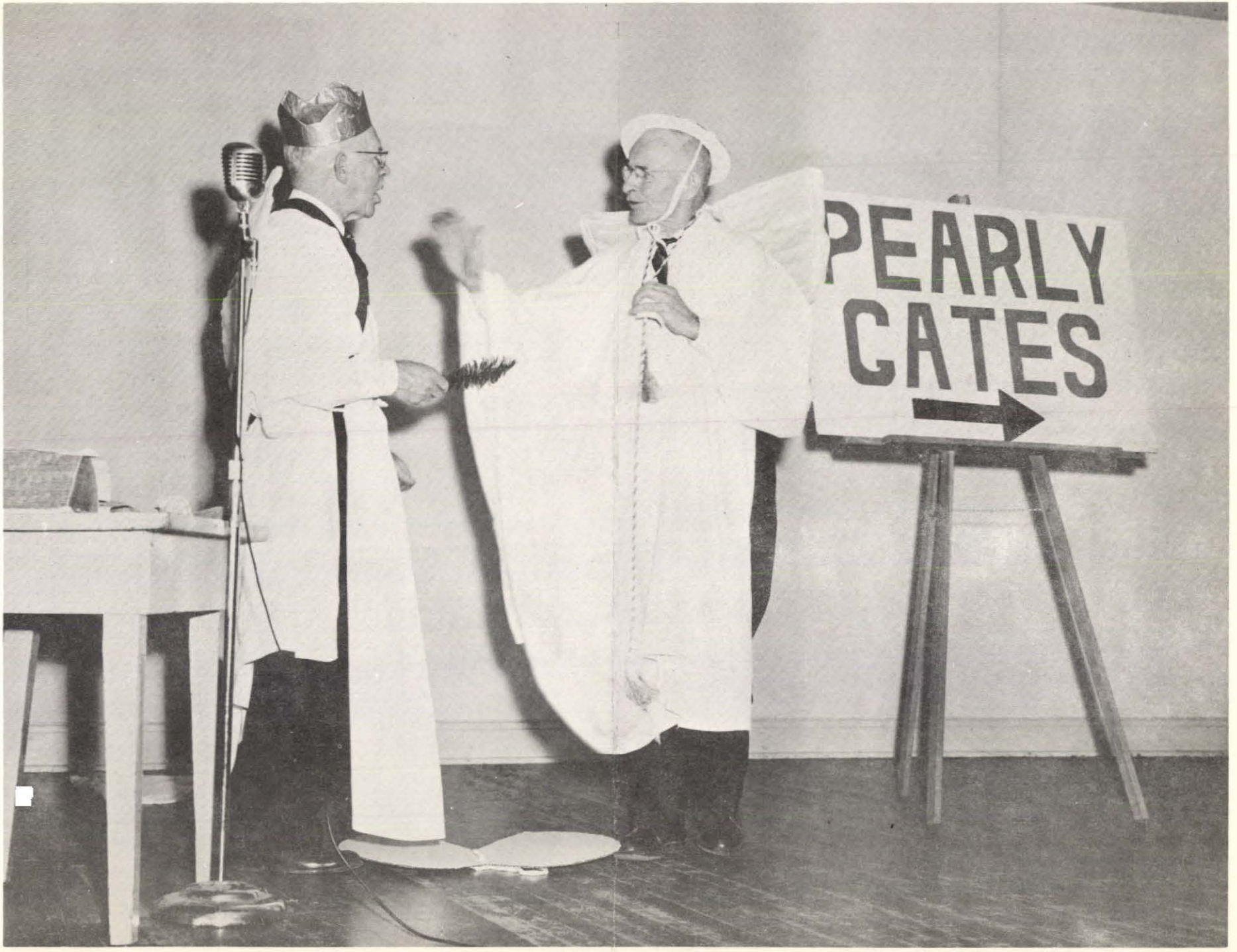
"DON'T CRY, SUZANNA" Song. . . . . Everyone

"HEAVENLY DAZE". . . . . By Jane Erickson

with
The G. S. O. C. Players

"GOODBYE, ROCK HUNTERS, GOODBYE". . Everyone

MR. STANLEY PRESENTS A LIFE MEMBERSHIP TO MR. AND MRS. LEO SIMON



BILL CLARK ("ST. PETE") EXPLAINS TO LON "DUFFLEDOPPER" HANCOCK

LEO DE ROC APPLIES TO ST. PETE
FOR ADMISSION TO THE "PEARLY GATES

GEOLOGICAL NEWS LETTER

OFFICIAL PUBLICATION OF THE

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

June 1959 **PORTLAND, OREGON**

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GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

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	1959 - 1960	Zone	Phone
President: Paul W. Howell	9130 S.W. Borders	23	CH 4-5728
Vice-Pres: Franklin M. Brown	211 S.E. 53rd Ave.	15	BE 6-6658
Secretary: Mrs. Victor Gregory	3621 S.E. Ankeny	15	BE 4-3137
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Display	Mr. Murray Miller	Historian	Mrs. Margret Peirce
Publicity	Mrs. Paul W. Howell	Public Relations	Mr. Clarence Phillips
Museum	Mr. Lon Hancock		

Society Objectives

To provide facilities for members of the Society to study geology, particularly the geology of the Oregon Country; the establishment and maintenance of a library and museum of geological works, maps, and specimens; the encouragement of geological study among amateurs; the support and promotion of geologic investigation in the Oregon Country; the designation, preservation, and interpretation of important geological features of the Oregon Country; the development of the mental capacities of its members in the study of geology; and the promotion of better acquaintance and closer association among those engaged in the above objectives.

Persons desiring to become members should contact the Membership Chairman.

Regular annual dues (single or family memberships) are $5 for residents of Multnomah and adjacent counties; $2.50 for others; and $2 for Junior Members. Make remittances payable to the GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Society Activities
(See "Calendar of the Month")

Evening Meetings: Formal lectures or informal round-table discussions on geological subjects, on the second and fourth Fridays of each month at Public Library Hall, S.W. 10th Avenue and Yamhill.

Field Trips: Usually one field trip is scheduled for each month.

Library Night: Once a month. Lewis and Clark College.

Luncheons: Informal luncheons, with geological motif, each Thursday noon in Room B, Chamber of Commerce Building, S.W. 5th Ave. and Taylor St. $1.00 per plate.

Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon at Portland Chamber of Commerce, 824 S. W. Fifth Avenue, second floor. One dollar. You are welcome.

Our Library Night at Lewis and Clark College will be discontinued during the summer months.

Friday June 12 — Your "best color slide" program. Bring your best three color slides showing geological subjects. Be prepared to tell what they are in 30 seconds or furnish a short written description.

Sat & Sun. June 20 & 21 — Field Trip. Saddle Mountain and vicinity. Meet at Saddle Mt. State Park overnight campsite noon Saturday. After lunch we'll tour points of interest in vicinity or on coast. Campfire session in evening. Sunday, 9:00 a. m., taking 4-mile trail to summit at 3250 elevation. Sunday arrivals should be on hand at 8:30. Lunch and drinks to pack. Trip leaders, Leo Simon and Dr. Francis Gilchrist to aid in queries on geology, birds, wild flowers, etc. so abundant on this trail. Eighty miles Portland to Park, about 200 miles round trip. In event of rough weather, trip to be postponed a week. Dr. Gilchrist's phone, NE 6-4792; Leo Simon's office, CA 3-0300, residence, BE 6-0549.

Friday June 26 — Dr. Earl L. Packard, noted paleontologist and author of many scientific papers who is now a Research Associate at Stanford University and who has been Professor of Geology at University of Oregon and Head of the Dept. of Geology at Oregon State College, will speak on "Fossil Marine Vertebrates of the West Coast."

Friday August 14 — Annual Picnic - Mt. Tabor Park.

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"GO AHEAD, JOE MEEK."

Many of our GSOC members will be interested to learn that the colorful mountain man and early pioneer of Oregon will come to life in a historical drama written as a salute to Oregon's Centennial by Jane Erickson, and to be given its premier production jointly by Oswego Community Theatre and Lewis and Clark College, directed by Dr. Clifford E. Hamar, Drama head at Fir Acres Theatre at Lewis and Clark.

The play deals with the inflamed emotions underlying Congressional debates over admission of Oregon to the Union; conveyed, however, in a social comedy, with romantic interest, sprightly dialogue and entertaining episodes, with particular emphasis upon the part played by Joe Meek in this connection. According to Dr. Hamar, it has been given the same perception and sympathetic understanding as was evidenced in the play concerning the Whitman massacre that many of us saw on its premier at Reed College, and which has since been produced widely in the United States and Canada.

"GO AHEAD, JOE MEEK" will open on July 8, at Fir Acres Theatre on Lewis and Clark campus and will run there for eight performances. A block of tickets has been set aside for our members and anyone desiring one may contact Mrs. James (Paula) Stauffer, our Social Chairman, at NE 6-3825, who is in charge of reservations.

Mrs. Delores Gregory has resigned as Secretary. Membership applications and correspondence for the Secretary should be addressed to Rose Hamilton, who served in this capacity last year. Miss Hamilton's address is 5412 S. E. Powell Blvd., Portland 6; Phone PR5-9762.

Mr. Vernon Newton, Petroleum Engineer, and Mr. Jasper Holland, Soil Conservationist, were guests of Hollis Dole and D. H. Griswold, respectively, at our Thursday luncheon, May 7.

Bob Wilbur is "pinch-hitting" as Editor of the Newsletter in the absence of J. R. Rentsch, on a vacation trip to the Atlantic Coast.

NICE GOING, GIRLS! - -

The final report on the afternoon tea at Lewis and Clark College indicates $100.00 raised toward purchase of electric water heater for Camp Hancock.

LEONARD M. BUOY

We were saddened to learn of the sudden death on Tuesday, May 19th, of Leonard M. Buoy, one of our long-time and valued members.

The Buoys recently returned to Portland after having lived for a time in Seattle, and had bought a new home on the Clackamas River, near Estacada. They have been members of our Society for ten years and their many friends among us extend deepest sympathy to the bereaved family.

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NEW MEMBERS

Mr. and Mrs. Roy John, 603 S. E. 54th Avenue, Portland 15, Oregon BE 4-4662
Mr. Gordon A. Johnson, 324 N-1st, Minneapolis, Minnesota
Mr. and Mrs. D. H. Griswold, 6656 S. W. Miles Court, Portland 23, Oregon

CHANGES OF ADDRESS

Mr. and Mrs. Emil Abramovic, 3212 S. E. Risley Avenue, Portland 22, Ore. OL 4-0938
Mr. and Mrs. Hugh Miller, 2165 Summit Drive, Lake Grove, Oregon
Mr. Frederick A. Robinson, 1622 S. W. Midvale Road, Portland 19, Ore. NE 6-6345
Mrs. Leonard M. Buoy, Rt. 1, Box 116, Eagle Creek, Ore. Crestwood 9-5108
Mr. Frank J. Merryman, 9318 S. W. 2nd Ave., Portland 19, Oregon

- - - - - - - - - -

Congratulations are in order! Our President, Paul Howell, has recently been granted his Ph. D. at the University of Arizona in Tucson.

- - - - - - - - - -

Just off the press -

"Geology of Oregon", by Dr. Ewart M. Baldwin, Professor of Geology, University of Oregon. Many of illustrations by Delano Aerial Surveys. It's a "honey". Bookstore at Portland State College has them.

- - - - - - - - -

Picnic-supper on Library night, May 19th, was enjoyed indoors at Lewis and Clark College. A tour of the lower campus, led by Leo Simon and Drs. Stauffer and Gilchrist, divulged the wealth of plant life and other materials employed in the development of this area. Films by Pan American Airways on Life in Alaska, by Phelps-Dodge Mining Corp. on mining in Arizona, and by our County Library on Life in a Norwegian Fjord area contributed to the enjoyment of the evening.

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ANOTHER CENTENNIAL ANNIVERSARY

Alexander Von Humbolt, 1769 - 1859

A most interesting article appears in May issue of Americas Magazine telling of the life of this early explorer, geologist and naturalist--one of the great on a world stage.

A TRIP TO THE MOLALLA SEASHORE

On Saturday, March 28, the Geological Society made a trip to the Molalla seashore to collect shells -- only these shells were at least 30 million years old and had to be extracted from the sand with a geologic pick.

In spite of a continuous drizzle of rain, about 35 people wearing ponchos, hip boots, and various other appropriate costumes, met at Molalla to go on the trip. Before starting, Rudolph Erickson, trip leader, gathered us about him on the sidewalks of Molalla. "We're going down to the beach to look for shells!" he said.

Evidence of seashore

Then he told us about the arm or embayment of the sea that once extended inland as far as the Molalla area. This sea covered parts of western Oregon intermittently from Eocene time, about 60 million years ago, to early Miocene, 30 million years ago. A great thickness of ashy sediments (tuffaceous sandstones and siltstones) accumulated on the bottom of this sea and along its shores. In the Molalla area these rocks are known as the Butte Creek beds and they are believed to be Oligocene or early Miocene in age.

Evidence for the shoreline having been in this area, Mr. Erickson told us, is seen in the close association of fossil shells and fossil leaves in the Butte Creek beds. Then Murray Miller brought forth a carton containing some of this shoreline evidence. The first was an exceptionally large fossil limpet (6 inches across) having the shape of a coolie hat. This kind of mollusk characteristically adheres to rocks close to shore. A second piece of evidence was a chunk of sandstone containing fossil clam shells and the rib of an aquatic mammal, such as a sea lion, whose skeleton must have washed up on the seashore. A third piece of evidence was a slab of fine-grained cream-colored rock containing the imprint of a large sycamore leaf. Of course the sycamore must have grown on land near the sea. All of these fossils, Mr. Miller informed us, came from rock outcrops we would soon visit.

Basement rocks

From Molalla we drove south on the Wilhoit road 4 miles to a large quarry on the right (west) side of the road. Here is exposed the basement rock of the Molalla area. This rock is a basalt or basaltic andesite which is generally considered to be of late Eocene age and contemporaneous with the Tillamook volcanics in the Coast Range. It represents lava flows, some of them submarine, which in places contain interbeds of marine sediments. This formation was named the Pre-Butte Creek volcanics by Harper who mapped the geology of the Molalla quadrangle (Oregon State College Master's Thesis, 1946). Zeolites, calcite, and chlorite occur in fractures and vesicles (gas-bubble holes) in the quarry rock.

Butte Creek beds

Due to the extreme moistness of the atmosphere, the quarry was given only a lukewarm leer, and the party continued south into the area where the Butte Creek beds crop out. These beds, which may be as much as 1,200 feet thick, are quite extensive (see accompanying map). In fact nearly every outcrop in the hills between the Wilhoit Road and Scotts Mills exposes this fossiliferous sandstone. In some places shells are so abundant that they form an impure limestone, such as at the quarry near Marquam.

The age of this formation has long been a matter of argument. Some geologists believe they can trace the formation almost continuously southward into similar sandstones of the Eugene formation that contain fossil shells of middle Oligocene age. On the other hand, Durham and others believe that the Butte Creek beds contain an early Miocene fauna and flora that is markedly younger than the fauna characteristic of the Eugene formation (for further details see: Geol. Soc. America Bull., vol. 53, p. 1817, 1942).

Shell bed

Our second stop was 6 miles south of Molalla at the junction of the Scotts Mills road with the Wilhoit road, where we parked. From here we followed a foot trail to a hillside outcrop of Butte Creek beds where the sandstone was so full of fossil clams that it was hard to tell where one clam left off and another began. The largest ones were a variety known as Spisula. Various

TRIP TO MOLALLA SEASHORE - continued

other pelecypods (clams) and a few gastropods (snail-like shells) were found here. Mr. Miller's giant limpet and the vertebrate bone came from this locality. Because the sandstone was so deeply weathered, most of the shells were extremely fragile. But even if they crumbled, which most of them did, they left behind a hardened impression or internal cast in the rock.

Wilhoit Springs

Our third stop was at the end of the road (about 10 miles south of Molalla) at Wilhoit Springs. This is a picnic and camping spot known for its mineral water. Here artesian water, containing carbon dioxide, percolates through the bed rock, dissolves a number of minerals (chiefly salt) and rises to the surface, or close enough to be easily pumped. It is said that four gulps of this carbonated "sea water" in repeated succession makes one an addict. Picnic lunches were greatly enjoyed at this spot, thanks to the owner of the Springs, and thanks also to a benevolent sun that broke through the clouds and beamed down on us.

Although we didn't visit the Wilhoit coal mine on this trip, we came very close to it. It is located on a side road just south of the gate to Wilhoit Springs. The coal bed, which is composed of compressed plant remains, is said to extend through the hill for several miles, and tunnels penetrate it for considerable distances. The interesting thing about this carbonaceous layer is that it lies between two layers of Butte Creek beds containing shells.

Leaf bed

Our fourth and last stop was at a road cut immediately east of Beaver Lake School on the Scotts Mills road, about 1-1/2 miles west of the junction of this road with the Wilhoit Springs road. Exposed in this road cut is a bed of fine-grained, cream-colored tuff of a clayey texture containing a variety of fossil leaf imprints. including sycamore like the one Mr. Miller showed us. Paleobotanist Jack Wolfe reports that these leaves are the same age (early Miocene) as the Molalla flora, which occurs in the Molalla formation along the banks of the Molalla River.

If we try to visualize what happened in this area in Oligocene or early Miocene times, we discover that the sea was not a stationary thing, but rather, its shoreline shifted back and forth many times over. There were long periods when it withdrew far to the west so that the old sea bottom became land and supported vegetation. With the return of the sea, marine beds containing shells were laid down over the plant remains. Interfingering of marine and terrestrial beds is characteristic of the rock formations along the east side of the Willamette valley from Molalla south to Eugene. By joining outcrops where shell and leaf beds interfinger, Lowry (GSOC News Letter, Jan. 1947) mapped the shoreline of the Oligocene sea (including early Miocene) in northwest Oregon. Copies of his map were passed around to the field trippers by Mr. Erickson.

Later lava flows

After the sea withdrew for the last time from the Molalla area, due to uplift of the land and folding of the strata, stream erosion began to carve valleys in the Butte Creek beds and older rocks. In middle Miocene time, lava known as Columbia River basalt oozed up through weak places in the earth's crust and spread out over the surface. It filled valleys and formed a solid blanket of basalt over everything except perhaps the highest topographic features. Although erosion has since removed much of this lave in the Molalla area, some of it still caps the Butte Creek beds in the hills near Scotts Mills. Small masses of basaltic or andesitic rock that protrude through the marine strata in various places are probably feeder dikes for Columbia River lava, or later lavas (Boring lava of Pliocene age).

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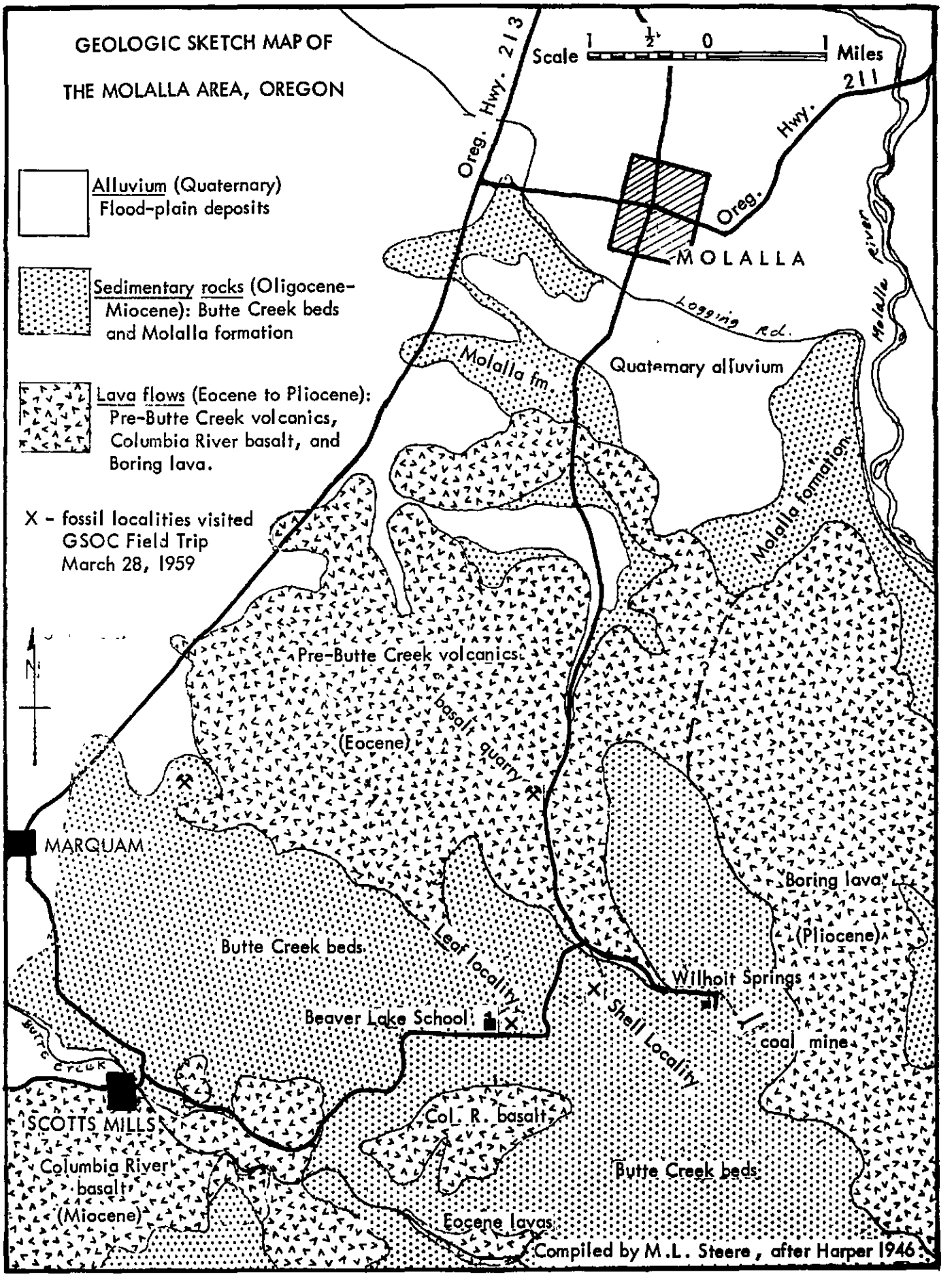
The trip came to a close at Beaver Lake School when a rumble of thunder announced the rapid approach of a rather ominous-looking storm. So we loaded our sacks of loot into the cars. scraped the mud of the seashore off our boots, and returned to the Recent geologic epoch.

M. L. Steere


GEOLOGIC SKETCH MAP OF
THE MOLALLA AREA, OREGON
Scale 1 ½ 0 1 Miles
Alluvium (Quaternary) Flood-plain deposits
Sedimentary rocks (Oligocene-Miocene): Butte Creek beds and Molalla formation
Lava flows (Eocene to Pliocene): Pre-Butte Creek volcanics, Columbia River basalt, and Boring lava.
X - fossil localities visited GSOC Field Trip March 28, 1959
Oreg. Hwy. 213
Oreg. Hwy. 211
MOLALLA
Molalla River
Logging Rd.
Molalla fm.
Quaternary alluvium
Molalla formation
Pre-Butte Creek volcanics (Eocene)
basalt quarry
MARQUAM
Butte Creek beds
Leaf locality
Beaver Lake School
Shell Locality
Wilhoit Springs
coal mine
Boring lava (Pliocene)
Butte Creek
SCOTTS MILLS
Col. R. basalt
Columbia River basalt (Miocene)
Butte Creek beds
Eocene lavas
Compiled by M.L. Steere, after Harper 1946

SCIENTISTS PROPOSE TO DRILL THROUGH EARTH'S CRUST - -

New York, N Y . April 2. 1959 -- A scientific plan as bold in concept as the artificial satellite program and even more rewarding in promise was described this week by Willard Bascom. staff member of the National Academy of Sciences The proposal: to drill a hole to the Mohorovicic discontinuity, the zone which separates the earth's crust from its underlying mantle. Such a hole. according to Mr. Bascom. would give priceless information about the earth's history and inner structure.

"All we know about the earth's interior," he said. "is based on indirect evidence. The first ideas concerning the subsurface composition of the earth were derived from volcanoes which obviously spewed out molten rock from the depths This indicated that material beneath the crust is liquid But tidal measurements proved this concept to be in error, that the interior is more rigid than steel. The study of earthquake waves. variations in gravity and related phenomena has finally lead to the tentative conclusion that the planet begins with a plastic core of nickle-iron composition which is in turn surrounded by a mantle of extremely dense rock overlain by a crust granitic in composition over the continents and basaltic beneath the seas. Seismic studies show that under the continents the crust is relatively thick, extending down to 30 miles or more. Under the seas, it is as thin as 6 miles. The proposed exploratory hole would be drilled through the thin section from an anchored barge

"Such a hole would make it possible to obtain samples of the various rocks of the mantle and the deep crust for chemical and physical analysis, including mineral composition, radioactive content, density and conductivity. With actual samples instead of supposed material combinations. the laboratory work on rock at high temperatures and pressures would become much more meaningful. It would then be possible to say whether the earth is cooling and to explain the high flow of heat through the ocean floor. It may also be possible to determine the age of both crust and mantle by the analysis of their content of radioactive isotopes.

"Although reaching the mantle is the ultimate objective of the Mohole project, an intermediate step is likely to yield equally valuable and interesting information. This is the taking of a continuous cylindrical sample. or 'core,' through the sediments of the ocean floor At no place on the continents are the earliest materials of the crust found undisturbed Hence. sediments taken from the deepest part of the ocean floor may comprise the most fabulous history book of all time; they could contain an uninterrupted record of the earth's development for two billion years!

"The earth's magnetic history may also have been recorded in the deep-sea sediments. As tiny particles of magnetic materials settle to the bottom they tend to align themselves with the earth's magnetic field. By examining the orientation of these particles in the sediment. it may be possible to determine changes in the positions of the magnetic poles The earth's climatic history will be similarly reflected And somewhere down there is the primordial surface of the earth -- perhaps similar to the face of the moon, covered by a layer of ancient meteorites. In all. the project promises a harvest of information, the richness of which is undoubted although difficult to estimate

"The decision to enlist international support for the project was made in a resolution adopted by the International Union of Geodesy and Geophysics in Toronto. Canada on September 14, 1957. During the discussion a Soviet scientist arose and said. 'We already have the equipment to drill such a hole and are now looking for the best place to sink it.' By September 1958 the Soviet Academy of Sciences had appointed a committee which is the equivalent to the Mohole committee associated with our own National Academy of Sciences Perhaps there will now be a race to the mantle."

By courtesy of Scientific American

A FOSSIL CLAM AND ITS ENVIRONMENT

Many marine invertebrates appear to be well adapted to the environment in which they are now living. In many instances it is possible to recognize the particular adaptive characters which the organism has acquired that fits him into his ecological niche. It may be assumed that ancient animals also must have similarly responded to the various factors of their environment

A FOSSIL CLAM AND ITS ENVIRONMENT - Cont.

The determination of an ancient environment is based upon such evidences as the rocks and their fossil content affords. The paleo-ecologist is concerned with the texture of the fossiliferous beds; their structures; mineralogical and chemical composition; any evidences of the salinities or temperatures prevailing at the time of deposition; and their fossil fauna and flora.

It may be of interest to call attention to what appears to be a very close relationship of a highly specialized fossil clam and the apparent environment in which it lived.

Plicatostylus gregarious is a most unique and highly specialized early Jurassic pelecypod. It was first found by the writer in 1926, at the site of the first Geology Summer Camp in Central Oregon. The region has since been studied by staff and students of the University of Oregon and Oregon State College, and more recently mapped by Stanford University scientists.

That species occurs in marine beds aggregating more than 500 feet in thickness as described by Ralph Lupher as the Robertson formation of the Middle Liassic stage of the Jurassic. That formation consists of a coarse basal conglomerate, conglomeratic sandstones, gray and greenish sandstones, shale and shell-limestones. The latter are often comprised almost exclusively of specimens and fragments of Plicatostylus. In the lower part of that formation that clam and a single species and the heavy shelled gastropod, Nerinia, form reefs several feet in thickness and traceable along the strike for hundreds of feet. They grade laterally into a sandy or shale facies, with a rich and distinctive fauna.

These sediments appear to have been derived from the nearby underlying deeply pitching beds of Triassic age. Those older strata include belts of harder and softer sediments.

A sea advancing on such a late mature terrain of hard and soft belts would soon develop headlands and embayments. The sediments in such a sea would be reflected in the Robertson beds by coarse deposits opposite the head lands and siltstones in the embayments, each type with a distinctive fauna.

The clam Plicatostylus and the snail Nerinia occur in coarse conglomeratic beds composed of occasional hard pebbles, shell fragments and a coarse sandy matrix. Such a composition, its recognizable structures and meagre fauna support the hypothesis of a reef environment opposite the headlands.

The minimum requirements necessary for a clam to live near the breaker line, in a region of swift currents and rapid accumulation of coarse sediments can be postulated. They would include a strong thick shell, a means of secure attachment and some method of overcoming the menace of rapid sedimentation. Plicatostylus, as a species, met, successfully those and other requirements for a successful life of thousands of years.

This strange clam possessed a slender columnar lower valve topped by a small cap-shaped upper valve. The lower valve grew upright from its small apex, that was firmly cemented to the sub-stratum, often a fragment of one of its fellows. In its early stage, the individual increased rapidly in diameter, but later more gradually, reaching in adulthood a possible transverse diameter of two inches and a height of as much as 15. They grew so close together that no two individuals are alike, for each vied for space, and consequently many are twisted, curved or even bent in conformity to their close neighbors. Their cross sections also varied from flattened oval to elliptical or even polygonal. All possessed on their dorsal side a striated area which represents the abandoned ligamental groove as the individual increased in height. In life the ligament joined the top of that valve to the small upper valve. Neither the upper or lower valves possessed interlocking teeth such as occur in many clams. Thus the powerful ligament and the internal adductor muscles performed the function of controlling the usual actions of the valves, and in holding them together. The body-cavity was conical, in the lower valve, and as the animal grew upward it filled in the lower abandoned part with secondary shell material. The walls were very thick and further strengthened by heavy folds which gave a turreted aspect to the columns.

The massive, thick shelled, plicated columns of Plicatostylus enabled that clam to withstand the strong currents of the surf-line, and to rise for food and oxygen above the rapidly accumulating deposits. The heavy ligament, compensated for the loss of interlocking teeth, also contributed to the remarkable success of that pelecypod in the Oregon seaway.

Nothing is known of this clam's antecedents nor has it been found in younger bed in Oregon or elsewhere.

Much later other groups of clams, collectively known as pachydonts met reef conditions

A FOSSIL CLAM AND ITS ENVIRONMENT - Cont.

in other ways. This suggests that the ancestors of these various Mesozoic pelecypods must have had different genetic potentialities which, through natural selection adapted them to reef conditions.

Dr. E. L. Packard,
Research Associate, Stanford University

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WHERE IS PEKING MAN? - -

Since the end of World War II Peking Man has disappeared. He left his domicile in the Choukoutien Cave forty miles Southwest of Peking some fifteen years ago. He was only 300,000 years old when he disappeared. He escaped the early ravages of the Japanese War with China by hiding in the Pekin Union Medical College, where he was officially christened Sinanthopus Pekinensis. He had a well authenticated visa to come to thie country in 1937, but it was cancelled by the Japanese, along with a few other cancellations at Pearl Harbor. Having left home, he had no place to go, so he attached himself to the U.S. Marines who were just leaving on the President Harrison (American Dollar Line).

Fortune, however, plays pranks with all of us. This playful prank by the Japanese took the form of forcing the liner aground and capturing the Marines including our friend "Sina" (for short). Is he at the bottom of the Yangtze River? Quien sabe? Anyhow, he has not been heard from since.

In 1942 the Japanese anthropologist Haseba Kotohito went to Pekin to study "Sina" but when the college vaults were opened there was no "Sina" just his plaster casts.

Frank Whitmore, Chief of the Military Geology Branch, thinks "Sina" is resting among the silts and sands at the bottom of the Yangtze near Shanghai. He also says that our best hope is to let him lie in peace and to make explorations in the lower levels of Choukoutein Cave, his old home. Anthropologists would, of course, welcome any of his relatives, male or female.

Source: Science, 27 March 1959. Extracted and mutilated by Jack Stevens.

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HOPE DIAMOND

The legendary Hope Diamond, largest and most notable of all blue diamonds in the world, was received on Monday, November 10, by the Smithsonian Institution for display in its Hall of Gems and Minerals in the Natural History Building. The exhibition of this rare gem was made possible through a gift to the Smithsonian by Harry Winston, world-famous gem merchant of New York.

The 44-1/2 carat blue diamond will be displayed in a central case especially built with all modern safety devices for maximum protection.

The Smithsonian Institution's Hall of Gem and Minerals contains the finest exhibition of gems to be seen anywhere in the United States. Now, with the acquisition of the Hope Diamond it becomes one of the outstanding displays in the world since the Hope ranks in importance with other stones, such as the Kohinoor, Orloff, Cullinan, and Regent found only in the Crown Jewels of Europe. In fact, because of its long and dramatic history, and its rare deep blue color, the Hope is possibly the best known diamond in the world. It will be a focal point of interest for the many thousands who visit the Smithsonian each day.

Though its early history is not known with certainty, the legends attached to the Hope date back many hundreds of years. Speculation ties the Hope to the famous "French Blue," once the eye of an idol in India, later part of the Royal Jewels of Louis XIV of France. Mr. Winston acquired the Hope from the estate of the late Mrs. Evalyn Walsh McLean of Washington in 1949.

HOPE DIAMOND - Cont.

It was presented to Mrs. McLean by her late husband, Edward B. McLean, in 1911. Its known history, prior to the McLean purchase, dates from 1830 when David Eliason, a noted gem dealer, sold the stone to Henry Thomas Hope, an Irish squire and banker, whereupon it became known as the "Hope Diamond." The stone was shown at the London Exposition in 1851. In 1867 it was sold at Christie's in London along with other gems from the Hope collection. It was acquired in 1908 by the Sultan Habib Bey, but after the Young Turks Revolt it again was placed on the market, and purchased by Mr. McLean in 1911.

In the following years it was seen frequently at Washington society functions, while worn by Mrs. McLean. Now the world famous jewel, returns to Washington to become the focal point of the permanent display of gems in the Smithsonian. It is Mr. Winston's hope, in making this donation, that there will be at the Smithsonian in our Nation's Capital, a National Jewel Collection, rivaling in historical background and in artistic quality the great Crown Jewels of other nations. The Smithsonian's Hall of Gems, spectacular new home of the Hope Diamond, already is the nucleus of such a collection. - - - - Smithsonian Institution

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SALT

Ordinary table salt, sodium chloride, may have had a considerable part in the evolution of civilization.

Apparently there is no need for it in the diet of normal healthy persons beyond that present in natural foodstuffs. Yet many persons develop an extreme craving for more--so much so that wars have been fought to assure an adequate supply. This craving may, in a way, be similar to that which some individuals develop for alcohol--for the action as a stimulant.

The effect apparently is related to the action of the adrenal glands--causing the increased release of certain hormones which have far-reaching secondary effects throughout the organism.

This thesis is presented by Dr. Hans Kaunitz of Columbia University in an article appearing in the most recent Annual Report of the Smithsonian Institution.

Requirement of salt in various pathological conditions is a quite different matter, he stresses. In normal health man can do with little. The same apparently is true for animals, which, nevertheless, sometimes develop a craving for it.

"The stimulating effect of salt," he writes, "probably sets in motion adaptive mechanisms involving enlargement of the liver, kidney, and adrenals; this has been found in experimental animals. Similar conditions have been discussed in many other stress conditions.

"The possible changes, especially perhaps in the emotional sphere, brought on by the stimulating action of salt are, of course, entirely a matter of speculation. The greater responsiveness of people, if they were so stimulated, could have helped throughout the ages in the accumulation of knowledge. Whether this is one of the roots of the reverence which was accorded salt by the ancients can scarcely be guessed at this time."

"Is there reason to assume that the constant use of salt has changed our intellectual capacity? ... one must assume that man in the upper paleolithic period (10 to 35 thousand years ago) did not salt his food; yet Cro-Magnon man created magnificent art. Intellectually, therefore, he was our equal. He differed from us only in his lack of knowledge. Thus, although salt eating did not change man intellectually but may have facilitated learning, it possibly was an important historical force."

Both physicians and public health workers sometimes recommend certain levels of salt in the diet. On this point Dr. Kaunitz says: "There is no question but that there is a sound basis for prescribing low-salt diets in many diseases, particularly those involving the circulatory system. When it comes to normal people, however, recommendations are infinitely more difficult. It is certainly true that the chemistry of the body does not require the addition of salt to our food. The physician, however, is not primarily interested in the mere metabolic processes but in the general welfare of his patients, and he should consider that the quickened pace of a more complicated society demands persons with a heightened responsiveness. Salt may be one of the ingredients producing this effect."

Smithsonian Institution

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GEOLOGICAL NEWS LETTER

OFFICIAL PUBLICATION OF THE

July - 1959 **PORTLAND, OREGON**

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GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

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Society Objectives

To provide facilities for members of the Society to study geology, particularly the geology of the Oregon Country; the establishment and maintenance of a library and museum of geological works, maps, and specimens, the encouragement of geological study among amateurs; the support and promotion of geologic investigation in the Oregon Country; the designation, preservation, and interpretation of important geological features of the Oregon Country; the development of the mental capacities of its members in the study of geology; and the promotion of better acquaintance and closer association among those engaged in the above objectives.

Persons desiring to become members should contact the Membership Chairman.

Regular annual dues (single or family memberships) are $5 for residents of Multnomah and adjacent counties; $2.50 for others; and $2 for Junior Members. Make remittances payable to the GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Society Activities
(See "Calendar of the Month")

Evening Meetings: Formal lectures or informal round-table discussions on geological subjects, on the second and fourth Fridays of each month at Public Library Hall, S.W. 10th Avenue and Yamhill.

Field Trips: Usually one field trip is scheduled for each month.

Library Night: Once a month. Lewis and Clark College.

Luncheons: Informal luncheons, with geological motif, each Thursday noon in Room B, Chamber of Commerce Building, S.W. 5th Ave. and Taylor St. $1.00 per plate.

Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon, second floor, Portland Chamber of Commerce, 824 S. W. 5th. One dollar.

Our Library Night at Lewis & Clark College will be discontinued during the summer months.

Friday July 10 7:30 p.m. — "Western Mountains and Scenery" will be shown in colored slides by Mr. Rudolph Erickson from his extensive collection. This will be an excellent and entertaining program.

Sunday July 12 8:30 a.m. — Field trip led by Dr. James Stauffer. Meet at north entrance to City of Oswego. Our group will be shown evidences of the great "Spokane Flood", will have our lunch at Champoeg State Park, and tour the Historical Museum.

Friday July 24 7:30 p.m. — "Vacationing in the West", a program of colored slides by Mr. Leo Simon. The vacation will feature Idaho, Eastern Oregon, and the Siskiyou Mts. The high quality of Mr. Simon's photographs is well known.

Friday Aug. 14 — Annual Picnic, Mt. Tabor Park. Details in August issue.

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Our Executive Board, in bestowing Honorary Life Fellowship to Mr. and Mrs. Leo Simon, have established a "first" in the history of our Society. We have no previous record of a man-and-wife team being the recipients of this honor. Our By-Laws specify that this title may be conferred "for outstanding contribution to, or attainment in, the study of Geology."

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Ruth Prentiss sends greetings to our Society from Goteborg, Sweden; stating that her next stop will be in Austria.

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As previously announced, Jane Erickson's historical drama "Go Ahead, Joe Meek" is showing July 8 - 11 and 15 - 18 inclusive at Fir Acres Theatre, Lewis & Clark Campus, 8:30 p. m. All seats are to be reserved, with tickets at $1. 50 and for students at 75¢. Reservations may be obtained by phoning NE6-3602 or NE6-2108 or by contacting Mrs. James Stauffer, our Social Chairman, NE6-3825.

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Our State Department of Geology & Mineral Industries on the top floor of State Office Bldg. in Portland now has Bulletin 50, "Field Guidebook to Geologic Trips Along Oregon Highways," for sale. A generous discount is granted holders of G. S. O. C. membership cards, making the price $1. 20. Seven long trips are carefully logged with discussion of the geological features to be seen along the way.

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NEW MEMBERS

Mr. & Mrs. Donald Eudaly, 5204 N. E. 28th, City (11)
Mr. & Mrs. F. Walter Schatz, Rt. 1, Box 280, Sherwood, Ore. NE 8-2092
Mr. & Mrs. Orvie E. Thompson, 1010 Main St., Tillamook, Ore. VI2-6379

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ANNOUNCEMENTS - continued

Mrs Eleanor C. Peirce has called our attention to her being erroneously listed as "Mrs Margret Peirce" on the list of Committee Chairmen which appears on the inside of the cover of Newsletter.

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Mr. Franklin Davis has been appointed Service Chairman by Pres. Paul Howell and announced at the luncheon of June 11.

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Mr. Ray Baldwin has just returned from a trip on which he attended the 50th reunion of his Class of 1909 at Rutgers University in New Jersey.

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Mrs. Cleveland Johnson has just returned from attending her 50th Class reunion at Olivet College, Olivet, Michigan.

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-- BIRDS OF THE ICE AGE

Washington, D. C., April 10, 1959. --Monstrous birds soared in the skies of North America during the million years of the ice age. There was, for example, a giant condor, Teratornis merriami, whose fossil bones have been found in California, Mexico, and Florida. Its wing span, so far as it can be reconstructed, must have been at least 12 feet--2 feet or more greater than the largest of its living kin. Though huge compared to all extant hawklike birds, it was completely eclipsed by another vulture (Teratornis incredibilis) of the same era which is known only from a single wrist bone found in a Nevada cave.

These giant scavengers, part of the 281 bird species now known to have existed in North America in the Pleistocene age which ended 30,000 years or less ago, are discussed by Dr. Alexander Wetmore, Smithsonian Institution research associate, in a bulletin recently issued by the Institution. The present normal bird population of the continent consists of 697 species, most of which certainly were present in the Pleistocene. Fossil remains of 198 of them have been found in Pleistocene deposits, and in addition there are now known bones of 83 completely extinct species.

The fossil record of birds, Dr. Wetmore points out, necessarily is sketchy for any period, since their fragile, usually hollow bones are likely to be preserved only under exceptional circumstances. One such location is found at the Rancho La Brea asphalt pits, now in the city limits of Los Angeles, Calif. Here, for ages, tar exuded on the ground, where it was often covered by dust or water, and animals became trapped in passing. The tar pits attracted the attention of such predators as sabretooth tigers, wolves, and eagles, which were caught in turn. The whole formed an automatic trap which operated for thousands of years. As the bodies sank gradually into the asphalt, flesh disappeared and the porous parts of the bones became impregnated, with the result that preservation has been complete and nearly perfect. At Rancho La Brea 100,000 fossil bones have been collected.

Other interesting species of the Pleistocene in addition to the great condors are a large-headed jabiru, a wood ibis at least a third larger than the living species, and a swan as large in bulk as the present trumpeter swan. Also there was an abundant flightless diving species, formed like a scoter but approaching a goose in body size. The wings were too small for flying, while the legs were large and strong and the pelvis heavy, an indication of the diving habit.

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Based on the article
"Non-Military Uses of Nuclear Explosives"
December 1958 issue

ATOMIC BOMB TO BE HARNESSED

New York, N. Y., December 4 -- The atomic bomb, long considered the ultimate in infernal

machines, may soon be harnessed as man's most efficient servant for the production of power, mining and large-scale excavation. it was announced this week by Gerald W. Johnson and Harold Brown physicists at the University of California's Radiation Laboratory in Livermore. California

"The constructive uses of nuclear explosions have been under active investigation by the Atomic Energy Commission for more than year," the scientists stated, "and the results of underground explosions studied thus far indicate a highly attractive possibility of generating power by means of the atomic bomb The method calls for detonating bombs underground and tapping the resulting reservoir of heat to drive conventional turbines on the surface.

"Existing power plants which exploit natural underground heat provide ample precedent for this approach to elect rical power production. The world's largest natural steam-power plant at Larderello. Italy, has been generating electricity from a volcanic heat-source since 1904; it produces 5 per cent of the country's power and its 150,000 kilowatt capacity is now being doubled. Thermo-nuclear explosions can be used to release such heat at other localities. At many sites temperatures of 1,000 degrees can be reached by drilling wells to depths of 15,000 feet -- comparable to the depth of many oil wells. This is fully deep enough to contain a 30-megaton explosion. The heat reservoir created by a single such explosion would yield 2,400 trillion kilowatt hours of energy--enough to operate a half-million kilowatt generating station for 15 years!

"Experience gained in the underground test explosion conducted last year in Nevada also indicated that atomic bombs may offer an attractive means for mining low grade ores. A properly placed and directed explosion of one kiloton, for example, could convert a 2 million ton deposit of solid copper ore to rubble. By forcing a stream of acidified water through this debris the copper could be dissolved and brought to the surface in solution

"Nuclear explosions may similarly be employed to get at the huge reserves of petroleum in the Canadian tar sands and Colorado shales which presently lie beyond the reach of economical extraction. At only 15 per cent recovery, each 100 foot depth of the tar sands along the Athabaska River, for example, would yield 100 million barrels of oil per square mile.

"Still another interesting application of the bomb could be the creation of reservoirs for the storage of fresh water. a problem of increasing urgency. The explosion would be set off in a natural drainage-basin at such a depth that the progressive cave-in of the initial cavity would proceed to the surface. In a dry river bed in a desert area such a storage chamber would be filled during spring or storm run-off. With the water stored underground evaporation losses would be reduced essentially to zero. Calculation shows that a 100 kiloton bomb would create a storage capacity of some 12 billion gallons

"Other obvious peaceful applications of thermonuclear blasts are the creation of harbors, such as the one proposed for Alaska and the manufacture of radioactive isotopes--to be recovered by mining the irradiated debris of underground explosions. Hence. it would seem that the thermonuclear reaction is destined to follow in the peaceful footsteps of the nitrogen fixation process which made possible the unlimited manufacture of chemical explosives for two world wars."

Scientific American

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CANADA GOOSE

Washington. D C , November 3. 1958 --A truly ancient bird is the Canada goose

Through most of the great glacial epoch preceding the present it had about the same range as today over most of North America. This is stressed in a report on fossil remains of this ubiquitous migrating bird by Dr. Alexander Wetmore, research associate of the Smithsonian Institution.

Bones have been found in ice-age deposits in Oregon, California, Florida, and Nevada

An additional piece of the jigsaw puzzle of its ancient distribution from the far west to the southeast of the present United States has recently come from St. Paul, Minn. --a fragment of a wing bone found at the bottom of a large trench dug by the city water department in an ancient peat bog. The finder, Scott K. Wright of St. Paul, who sent the bone to Dr. Wetmore for identification, believes the deposit to date from the glacial period. Associated with

it in the same trench were found remains of an ice-age species of bison. The bird bone showed evidence of being quite ancient.

During the later ice-age time southern Canada apparently had abundance of birds, Dr. Wetmore reports. He has identified remains of several kinds found in two small caves near Hamilton, Ont., by Dr. Hugh R. Thompson of McMaster University and his associates.

Geological evidence, Dr. Thompson says, shows that the bones were washed into the ice-age Lake Iroquois, long since vanished, and sank to the bottom, where they were buried.

Fossil bones in the collection, as identified by Dr. Wetmore, represented wood duck, reported from ice-age deposits for the first time, barred owl, fossil remains of which previously have been found only in ice-age deposits in Florida, and a red-winged blackbird and grackle, fossils of both of which previously have been found in Florida.

Smithsonian Institution

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Based on the article "Bogs"
October 1958 issue

DECAY OF BOGS MAY ALTER CLIMATE

New York, N. Y., October 30-- By liberating huge amounts of carbon dioxide, a component of air which helps to trap the energy of sunlight, the slowly rotting peat bogs of the earth may seriously alter global climate, it was stated this week by Edward S. Deevey, Jr., director of the Geochronometric Laboratory at Yale University.

"The carbon dioxide content of air has increased by 11 per cent since about 1870 and is still increasing," said Dr. Deevey. "The climate is growing warmer. Does this represent a cause-effect relationship? Radiocarbon assays prove that most of the added carbon dioxide is compounded of modern carbon. It is much too young, judging by its high radiocarbon content, to have come from the burning of fossil fuels by industry. The finger of suspicion points to peat bogs as a source. According to reliable estimates some 223 billion dry tons of peat are now held in storage by the bogs.

"Such bogs form in the lowlands when rainfall is great enough and the summers are cool enough. Usually they mark the site of former lakes. An entertaining stream dumps silt into the lake, Plants growing at the edge add their debris. More organic material is deposited by run-off from the surrounding land. Eventually the lake is obliterated and the mud becomes firm enough to support shrubs and then trees. Pools left in the center of the lake may be bridged by plants like the sedge or swamp loosestrife. With their aid other plants form a floating mat on which trees can grow while the water below is yet unfilled. In contrast, bogs of the 'raised' type do not have to start in a lake. They can form in any wet meadow and depend on the presence of sphagnum, commonly known as peat moss. Where sphagnum grows in large masses it raises the water table, sheds rain and, so watered, spreads at the edge. Eventually such a bog reaches a size at which evaporation balances the rainfall and growth halts. Plant debris on the surface then decays about as fast as it accumulates and liberates carbon dioxide. Any change in climate may retard the process or accelerate it. Thus the layered structure of a bog presents a matchless record of past climates.

"The record shows that the earth's climate has been warming for the last century and this may well have set a slow fire to the peat, simply by favoring surface oxidation by soil bacteria. If the climate should become so warm and dry that all the peat is oxidized, some 366 billion tons of carbon dioxide would be released to the air. This is a sixth of the amount now present in the atmosphere. The whole reserve of carbon in land plants and animals is only 15 times as much. The estimate does not include the carbon of humus in ordinary soils which would also be oxidized if the climate changed. So it is not impossible that the carbon dioxide thus far added to the earth's atmosphere has come mainly from peat and humus.

"Though the changes in climate and the amount of carbon dioxide in the air have run parallel in the past, we cannot be sure which is cause and which effect. We know, however, that carbon dioxide added to air causes it to absorb more heat from the sun. So the amount added recently could account for the rise in global temperature and if this proves to be so we may be in for trouble. Doubling the carbon dioxide currently in the air would almost certainly warm the climate

enough to cause the glaciers to melt. This runoff would raise the level of the oceans perhaps as much as 100 feet with the consequence that New York and London would simply have to move. The pixies, bogies and witches, long known to inhabit bogs, will also need new haunts because the bogs will have disappeared into thin air."

Scientific American

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- OREGON CORAL IDENTIFIED -

A fossil discovered recently at Mist, Oregon, by Mr. and Mrs Barry Jamieson of Portland, and brought into the office of the State Department of Geology and Mineral Industries, has been identified by Dr. Myra Keen of Stanford University as a coral. Its official name is Flabellum hertleini Durham. The coral, actually a group of them in this particular rock sample, is a well-preserved simple coral, or corallite, with fine but conspicuous radiating septae showing a ringlike pattern. It is so flattened that its appearance is more like that of a pelecypod or brachiopod. Because it had everybody who saw it thoroughly puzzled, this specimen and a similar one owned by Mike Brown, and believed to be from the same locality, were sent to Dr. Keen for identification. Dr. Keen reports that this coral was named in 1942 by Dr. J. Wyatt Durham, University of California, from specimens found in lower Oligocene Townsend shale (Keasey equivalent) along the Willapa River near Holcomb, Washington. It is described and illustrated in "Eocene and Oligocene coral faunas of Washington," Journal of Paleontology, vol. 16, no. 1. Jan. 1942.

This coral adds to the growing list of interesting early Oligocene fossils that have been found at the Mist locality on the upper Nehalem River. Some of the other fossils are crinoids, sea urchins, fish teeth, dentalium, and various pelecypods and gastropods.

M. L. Steere

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CAMP HANCOCK WORK TRIP

There was great activity at Camp Hancock on May 23 and 24 when G. S. O. C. ers and members of the Agate and Mineral Society took hammers, saws, and wheelbarrows and made building improvements for the coming summer session of camp.

Those who arrived Friday night were early at work Saturday morning. There were two big projects. Under the direction of Murray Miller a cement floor for the girl's quarters was being laid, and under the direction of Lon Hancock the restoration of his "office" building, which had blown flat twenty feet away from its foundation in a big wind storm last winter, was in process. At the cement project there were men, and boys, and girls mixing and pouring cement and wheeling wheelbarrows of gravel. All day long they worked, only stopping for the lunch hour, and the women sometimes sat nearby to encourage them.

There was hammering and sawing at the building project, and Bobby Brown remarked. "It's quite noisy in our neighborhood today." Milvoy Robosky arrived with his sister, Emily Moltzner, Saturday morning and brought a load of shakes, hand made by himself, and all afternoon the men worked in the hot sun laying them on the roof. By now the women were taking siestas, some of them having walked to the nut beds in the morning, and Bobby and Dicky Brown were playing with a bull snake they had captured and hoped to take home as a pet.

A tired crew stopped about 5 P. M., and preparations for dinner were begun at the various camps. Later thirty-one of us circled about the big campfire under the stars. It was interesting to look at the planet Jupiter in the east through binoculars and see two of its moons Our moon was not up, but those who had been at camp the night before had enjoyed moonlight from a glowing full moon.

An introduction to the campfire meeting was made by Murray Miller. He thanked those who had worked so hard, and said that the work we had come to do had been completed, and that a trip was planned for the next day. Paul Howell then described the trip, one for the G. S. O. C. s and one for the Agate and Mineral members, eight of whom were present, but Al Keen suggested that we combine both trips, and so that was agreed upon, and the hour to start was to be 7 A. M. Then Lon Hancock told us some things of both geological and historical interest about the Clarno. He said that many geologic periods were represented here, from Permian, through Triassic, Jurassic, Cretaceous, and most of the Cenozoic (excepting Paleocene). After his talk Ralph Mason spoke about the National Geological Seminar to be held at Corvallis this summer.

As everyone was ready to turn in as early as possible after the hard day's work, the campfire soon broke up. Before long all was silence in this part of the Clarno under the stars.

Not only were we awakened by the meadow larks, bright and early next morning, but by a whistle that indicated it was 5:30 A. M., and time to get up in order to be ready for the trip to the mammal and agate beds. Immediately the camp came alive, and soon there was an aroma of coffee and bacon cooking. At seven a group gathered, and we started on our hike.

First we stopped near camp to see an example of "slickensides," a smooth surfaced rock where there had one time been a fault and one large mass had rubbed over the other. As we climbed the hill toward the nut beds, Paul Howell showed us some small, black pebbles that, he said, were Mesozoic. He pointed out, across a canyon on another hill to the east, a very good example of the lines of fracture of a fault. Our hike went on from here to the mammal beds, where geology was for the time interrupted by the unusual sight of two bull snakes mating. With great excitement both naturalists and photographers gathered to watch and take pictures. Murray Miller told us about the mammal beds and diggings. Then we went on across the top of a hill where we could see the John Day River and the town of Clarno, a green spot in the distance below. Along the crest of this hill was a line of welded tuff, and this made a border between the Clarno and John Day formations. As we went on we could look across to Iron Mountain, and also saw other famous fossil beds in the distance. Someone sighted antelope in a canyon far below, and Murray Miller said they were beginning to come back to this area, where they had once been so abundant.

Our hike took us finally to some agate beds, where the rock hounds immediately went to work searching for specimens. Once in Miocene times there had been a Hot Springs here, which was indicated by some of the rocks that were found.

The group broke up here, and some went back to camp, leaving the more avid rock hounds behind to come later. Several of the men, who had remained at camp, had finished putting the shakes on the "office" roof. Lon Hancock had stopped work long enough to feed the pet golden mantel squirrel, Charlie(who had babies last spring, so now was called Charlotte.)

Regretfully we packed up to leave to go back to office and house chores, but we shall carry memories of an interesting and wonderful week-end with much accomplished at Camp Hancock.

THE HAYWARD PEIRCE FAMILY

THE INCONSTANT SUN

Based on the article
"Climate and the Changing Sun"
June 1958 issue

New York, N.Y . June 26 --

Had Romeo been a modern he would doubtless have wooed Juliet by day as well as night. But swearing on "yonder blessed sun" would not have strengthened his suit according to Ernst J. Opik, an astronomer at the Armagh Observatory in Northern Ireland. The sun, in Dr. Opik's opinion, is quite as inconstant as the moon -- and with consequences for man which far transcend the bounds of romance. The long-term flickering of solar fires. he insists, will one day boil the oceans.

"Many theories have been advanced in explanation of the long-term swings in climate," said Dr. Opik this week. "the swings which periodically extinguished life until some 750 million years ago. Reasons for the onset of brief but severe ice ages sandwiched every quarter billion years or so between balmy epochs have been variously ascribed to dust clouds from volcanic explosions. changes in the tilt or orbit of the earth, and so on. None of these theories has proved convincing. In the end we always come back to the simplest and most plausible hypothesis: that our solar furnace varies in its output of heat.

"We can account for the known swings of climate on earth merely by assuming that the heat output of the sun has fluctuated by 8 or 9 per cent from its present norm. A fall of 8 per cent from today's average temperature would reduce global climate to that of the coldest ice age. A drop of 13 per cent would cover the earth with a mile-thick layer of ice. A rise of 30 per cent would boil the oceans. Swings of 8 or 9 per cent appear from the geological record to have occurred with clocklike regularity every quarter billion years. How did they come about?

"As is well known, the sun produces its heat by nuclear fission. by burning hydrogen into helium. If the sun radiates energy faster than energy is produced. the sun contracts and the nuclear reaction speeds up. In contrast, if the rate of production at the hot core exceeds the rate at which energy is radiated. the sun expands and the reaction slows down. Thus balance is achieved automatically and the output of sunshine is in equilibrium.

"But we must reckon with the effect of materials other than the hydrogen fuel which slowly diffuses into the core. Heavy metals are left behind which diffuse into the core even more slowly. Hence. in the course of a quarter billion years, if our calculations are correct. an insulating blanket of metallic debris accumulates outside the core which restricts the flow of energy into space and upsets the built-in system of automatic control The earth then receives less heat and experiences an ice age. Violent convection currents are thereupon produced within the sun; these mix the gases and the cycle resumes.

"In addition to this cyclic phenomenon. through the eons the sun has slowly been consuming its hydrogen with the result that the core has been shrinking from the beginning. As the core of a star shrinks the star becomes hotter. Accordingly, the temperature of the sun has shown a long-term upward trend Earthly climate has grown correspondingly warmer.

"It is assumed that hydrogen constituted 33 per cent of the sun's core originally and that this has now declined to about 10 per cent. The core has shrunk from about 10 per cent of the sun's radius to about 6 per cent now. According to these calculations. before three billion years ago the normal climate of the earth. even during the long spells when the production of energy by the sun was in equilibrium, must have been that of a permanent ice age. A billion years or so from now the average temperature will be 100 degrees. too hot for human life as we know it. Some 82 million years later, if our timetable is correct. the output of heat by the sun will be more than three times what it is now and the average temperature on the earth will be above the boiling point of water. But if we are to judge by the transience of other species of living things, we can hardly expect our species to endure for more than a fraction of this interval, quite apart from climatic considerations."

Scientific American

1958 and 1959 GSOC FIELD TRIPS

MARCH 30. A basement trip to examine agates, minerals and fossils. Leaders, Al Keene and Franklin Brown.

APRIL 27. A trip to Bay Ocean and Tillamook to examine costal geology with a side trip through the Tillamook museum. Trip leaders, Dr. Francis Gilchrist and Dr. James Stauffer.

MAY 24-25. A visit to Camp Hancock near Clarno to do a bit of work around camp and to learn more about the interesting geology of this region. Leaders, Dr. Arthur Jones and Lon Hancock.

JUNE 15. A study of geology along the north shore of the Columbia between Vancouver and Bonneville Dam with a climb to the top of Beacon Rock as an added attraction, Leader, Paul Howell.

JULY 4-5-6. A visit to the Three Sisters and Century Drive area A very informative opportunity to see and learn of the volcanic and glacial activity in this region. Trip leaders, Phil Brogan, Sr., Dr. James Stauffer and Phil Brogan, Jr.

JULY 20. An examination of the geology along the Clackamas River. Trip leaders, Rudolph Erickson and Franklin Brown.

AUGUST 16-17. A visit to Mt. Rainier and an examination of the glaciation and geological history of this region. Trip leaders, Dr. Francis Gilchrist and Leo Simon.

AUGUST 24. An examination of the various contact areas in the Mollala region. Leaders, Dr. Ewart Baldwin, Dr. Francis Gilchrist and Rudolph Erickson.

SEPTEMBER 14. A trip to Fogarty Creek State Park and Beverly Beach, RAINED OUT. Trip leaders, Leo Simon and Franklin Brown.

OCTOBER 5. A drive around the Mt. Hood Loop Highway to examine the effects of glaciation in this region. Trip leaders, Leo Simon and Franklin Brown.

NOVEMBER 16. A chartered bus trip to the University of Oregon geology department. The lecture halls, workshops and equipment were examined. Trip leaders, in transit, Dr. James Stauffer, in the geology department, Dr. Ewart Baldwin and in the geology museum, Dr. Arnold Shotwell.

DECEMBER. No field trip.

JANUARY 18, 1959. A visit to an outstanding collection of minerals owned and displayed by Mr. Richard Rice.

FEBRUARY 15. A visit to two basement collections of fossil woods and mammals with a lecture from Lon Hancock for dessert. Trip leaders, Dr. James Stauffer and Paul Howell.

MARCH 28. This was a collecting trip to several new leaf and marine fossil locations near Mollala. Trip leaders, Murray Miller and Rudolph Erickson.

I wish to take this opportunity to express my appreciation to the many trip leaders who have contributed so much of their time and knowledge to make these trips such a success. Thank each and all of you.

Franklin Brown,
Field Trip Chairman

GEOLOGICAL NEWS LETTER

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OFFICIAL PUBLICATION OF THE

GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

Aug 1959 PORTLAND, OREGON

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GEOLOGICAL SOCIETY OF THE OREGON COUNTRY

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1959 - 1960

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Society Objectives

To provide facilities for members of the Society to study geology, particularly the geology of the Oregon Country; the establishment and maintenance of a library and museum of geological works, maps, and specimens; the encouragement of geological study among amateurs; the support and promotion of geologic investigation in the Oregon Country; the designation, preservation, and interpretation of important geological features of the Oregon Country; the development of the mental capacities of its members in the study of geology; and the promotion of better acquaintance and closer association among those engaged in the above objectives.

Persons desiring to become members should contact the Membership Chairman.

Regular annual dues (single or family memberships) are $5 for residents of Multnomah and adjacent counties; $2.50 for others; and $2 for Junior Members. Make remittances payable to the GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Society Activities
(See "Calendar of the Month")

Evening Meetings: Formal lectures or informal round-table discussions on geological subjects, on the second and fourth Fridays of each month at Public Library Hall, S.W. 10th Avenue and Yamhill.

Field Trips: Usually one field trip is scheduled for each month.

Library Night: Once a month. Lewis and Clark College.

Luncheons: Informal luncheons, with geological motif, each Thursday noon in Room B, Chamber of Commerce Building, S.W. 5th Ave. and Taylor St. $1.00 per plate.

Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon, second floor, Portland Chamber of Commerce, 824 S. W. 5th. One dollar.

Our Library Night at Lewis & Clark College is discontinued during the summer months.

Friday Aug. 14 — Our 25th Anniversary Picnic in the crater at Mt. Tabor Park. Festivities begin with supper at six. Families and friends of the Society invited. Rolls, butter, coffee, tea, and milk furnished. General Chairman Rose Hamilton says bring same item as last year, plus your set-up for tableware. Food Chmn. Mrs. Franklin Brown (BE6-6658) will assist newcomers with suggestions. Mrs. Amza Barr heads the Telephone Committee, and Pres. Paul Howell the entertainment. Entertainment plans are being directed toward commemorating the event of the Society's 25th Anniversary. If you have a skit or other idea that will fit this theme, contact Rose Hamilton (PR5-9762), or our Pres. Paul Howell (Ch4-5728). Don't delay, phone today!

Sat. & Sun. Aug 22/23 — McKenzie Pass Field Trip. Meet at McKenzie Bridge by 2:00 p. m. Saturday. This is east of Eugene, on U. S. Highway 126. Several Forest Service camps are in the area; among them are Alder Springs, Frog, Scott Lake, Huckleberry Lake, and Lava Camp Lake. These camps are all east of McKenzie Bridge on U. S. 126. Cabins are usually available at McKenzie Bridge.

The return trip on Sunday will be by South Santiam Highway from Sisters on a triangular tour by way of Fish Lake, Clear Lake, Sahalie and Koasah Falls on the McKenzie River, coming out at Belknap Hot Springs. Round trip from Portland about 400 miles.

Trip Leaders, Leo Simon, CA 2-0300 or BE-0549
Franklin Brown, BE6-6658
Doug Williamson, one of our GSOC's from Eugene

Friday Aug. 28 — No program this month.

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IN MEMORIUM

It is, indeed, a sorrowful task to record the untimely passing of one of our most valued and stalwart members, Raymond L. Baldwin, charter member, President of the Society in 1953-54, former Business Manager and Editor of the News Letter for many years.

Ray returned recently from a trip to New Brunswick, New Jersey, where he attended a reunion of his class at Rutgers, the state university. Subsequent to his return, he gave two interesting talks at successive G. S. O. C. weekly luncheons in which he spoke of many interesting sights and events he enjoyed during his trip. His diligence in seeing that the members had their News Letters bound in annual volumes was a valuable service that was much appreciated.

After 30 years of Federal Civil Service employment in the Department of Agriculture, he retired ten years ago, at which time he and Mrs. Baldwin took an automobile-trailer sightseeing trip of one year throughout the East.

Ray's friendly disposition, his kindly humor, and his interest in the welfare of the Society endeared him to all of us. We shall miss him very much.

F. L. D.

SADDLE MOUNTAIN TRIP

On Saturday, 20th June, a group of the hardier souls of GSOC gathered at the Saddle Mountain camp ground for an examination of the local geology and flora. The trip was ably led by stalwart members Dr. Francis Gilchrist and Mr. Leo Simon. Dr. Gilchrist presented us with a geologic map and section of the Saddle Mountain area and a list of flora to be found along the Saddle Mountain trail. Saturday afternoon was spent on a side trip to Necanicum River and Ecola State Park areas. A particular thrill for this writer was the trip into the Necanicum River area to look at the largest known Douglas Fir and Sitka Spruce trees in existence. When one looks at these trees he cannot help but be awed by their obvious great age. To the neophyte geologist this helps bridge the gap between his own life span and the eons of geologic time, for it is only by such comparisons that we are able to grasp the vastness of the latter.

At Ecola State Park we traveled to the northernmost camp ground, Indian Beach, where remains of the ancient shell middens are to be found. Here we were treated to the sight of some of the most striking sea stacks to be seen along the Oregon coast. These were composed of lavas and volcanic breccias and were sculptured into both rounded and pillar-like forms. The headland at the north end of the beach consists of a great basalt massif formed largely of columns 3 to 4 feet in diameter tilted slightly seaward. The basalt is dark gray, but with a slight pepper-and-salt texture, and medium-grained. It is similar in all respects to that in dikes cutting the Astoria formation throughout this part of the Coast Range. A large body of coarse-grained rock known to exist somewhere on Tillamook Head was not found during our brief reconnaissance and must lie yet farther north than Indian Beach. Coarse cobbles and boulders of this plutonic rock strew the beach from Tillamook Head north to Seaside. Samples of the rock were collected from the beach at Seaside and examined by the group. At least one of these appeared to contain mica, and on this basis the rock may be a syenite or a camptonite. Both types have been previously reported from the Coast Range.

On Sunday, 21 June, several more members of the GSOC made their appearance. A short conference-and-briefing was given to the group by the trip leaders and then we were allowed to take off on our own. Because of the varied interests of the members present, we were not kept in one group as is usually the case. The writer proceeded forthwith to climb the mountain with his family. A very good trail leading ever upward stretched out before us, and we set out with great enthusiasm which scarcely diminished throughout the climb. In succession we passed crags of basaltic volcanic breccia and narrow dikes of columnar basalt which resembled long stacks of stony cordwood ascending the mountain like crooked stairs. Wild flowers abounded everywhere and many members had a field day examining and checking on the many varieties. Of these I'll say no more here, for Dr. Gilchrist has promised to write up the botanical aspects of the trip.

Finally we reached the summit of the mountain, and from there we had an awe inspiring view down onto the country below. Away to the west foaming breakers laced the beaches with white, and northward the Columbia River extended landward between its cliffs like a misplaced fiord. Immediately below us lay the headwaters of Young's River and Lewis and Clark River, and from here they traced their way northwestward to the mouth of the Columbia. An examination of their valley characteristics indicates that they originated as consequent streams on the slopes of the ancient volcanic massif of which Wickiup Mountain, Saddle Mountain, and Onion Peak are remnants. The streams are presently entrenched from alluvial plains developed during an ancient period of marine terracing (Personal Communication from Mr. R.K. Dodds). Saddle Mountain itself is 90 percent volcanic breccia, and amongst the breccia fragments are numerous volcanic bombs, some as large as a barrel. Much of the material is glassy, indicating rapid chilling, as might be expected during a submarine eruption. Dr. Ewart Bladwin, who has done much work in this area, postulates (Geological News-Letter, vol. 18, p. 29) that these breccias were erupted into the sea and mentions pillow lavas as components of the deposits of Saddle Mountain. However, none of the latter were noted along the trail. Bedding planes in the breccias and tuffs adjacent to the trail near the first ridge summit dip 20 to 30 degrees south. These and other stratigraphic attitudes in the area indicate a center of eruption a short distance northeast of the present peaks. According to Baldwin, Saddle Mountain is located on the southern limb of a syncline which parallels the Columbia River to the north. It is apparent from these data that the attitudes of the breccia beds are a local depositional feature

Saddle Mt. Trip - cont.

and have little to do with the regional structures. Astoria formation beds are exposed in the Saddle Mountain Road about a mile and a half south of the camp ground, but they appear to be nearly horizontal in attitude.

Fog swirling around Saddle Mountain's peaks allowed but momentary glimpses of good photographic subjects, but the writer is convinced that photo subjects abound there when conditions are right and he is determined to return for another try.

Paul W. Howell

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New Members

Mr. & Mrs. Fred E. Miller, 3122 S.E. 73rd, City (6) PR 1-6154
Mr. & Mrs. Clair E. Pense, 17021 S.E. Division, City (36) AL 4-7101

Announcements

Irving Ewen has been appointed Chairman to head up arrangements for our Annual Banquet close to March 1.

Mrs. Paul Howell will handle publicity for our Annual Picnic.

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HOW OLD IS OUR WESTERN OREGON LANDSCAPE? - -

The land on which we live is a matter of interest to all of us, and well it should be. It furnishes beauty and recreation for us; it supplies us with food, water, minerals, building stone, and lumber. To the geologist the land means something more, however. He is interested in the rock formations that make up the backbone of the land and in the development of the landscape itself. His interest goes even beyond that to the time element and the sequence of events that produced the formations and the landscape.

Western Oregon has a very interesting landscape -- not complex or classic as in some better described regions, but distinctive nevertheless. At first acquaintance the landscape seems very simple and worthy of little study, but as one examines it further there appear broad scale features that speak of very interesting events in its past. Many of these broad scale features have gone unrecognized by some of our best geologists. In other cases their existence has been disputed. Equally as controversial as the features themselves is their age and the sequence of events that produced them.

Viewpoints must change with new evidence, however, and it is intended below to present such new evidence (along with other evidence not so new). The writer also presents his conclusions and believes that most of his readers will agree with him after reading this article.

Foley Ridge

Foley Ridge forms a steep-faced, more or less flat-topped divide separating the McKenzie River from Horse Creek. The divide ends in a sharp nose just south of the settlement of McKenzie Bridge. The rocks forming the ridge are well exposed on the south side of the nose, and a visit to this locality is well worth any geologist's time. The topmost strata consists of a thirty-foot thick flow of High Cascade basalt. Beneath the flow and at some points extending down to depths below the present flood plain is a deposit of moderately cemented gravels nearly 200 feet thick. The upper 10 feet or so of the deposit consists of silty tuffaceous sandstone baked for several inches below the contact. The constituents of the deposit are largely cobbles of porphyritic andesite and other volcanic rocks unlike the High Cascade basalts. By the law of superposition we know that the basalt flow is younger than the gravels below, and the constituents of the gravel deposit indicate that is probably predates the High

Cascade basalts as a whole. Accepting the age of the High Cascade basalt as late Pliocene, we can say with some assurance that the gravel deposit is late Pliocene or older. From this we must accept an age of middle Pliocene or older for the McKenzie River valley.

Oakridge Gravels

The ridge north of the town of Oakridge is composed in part of old well-cemented gravels. The deposit extends to the top of the ridge, and the thickness represented there exceeds 250 feet. West of Oakridge near the town of Westfir the gravels are overlain by a flow of High Cascade basalt which came down the valley of the North Fork and into the main valley. The contact is largely obscured, but at one or two places in the bluffs above the Hines Lumber Company mill the contact can be exposed with a little digging. The North Fork flow is a late part of the High Cascade basalt outpourings, perhaps as late as early Pleistocene. As the gravels underlie the basalt their age is at least early Pleistocene and probably is as great as middle Pliocene. The age of the valleys are deduced from this would have to be at least pre-Pleistocene and probably is much greater.

Marks Ridge

Marks Ridge is a high eminence paralleling the South Santiam River north of the town of Sweethome. On the upstream end it begins north of the town of Foster with a high knob known as North Butte. From this point it extends down river for four miles. The ridge is composed of fine-grained black basalt having characteristics typical of Stayton Lava and Columbia River basalt -- brick bat structure in the upper part and columnar structure below. Recent drilling by the Corps of Engineers at North Butte revealed a lava thickness of 340 feet. Underlying the lava is several feet of cemented gravel the constituents of which are fresh and similar to those in the present South Santiam River gravel. The configuration and position of the ridge, plus the presence of the underlying gravel leads to the conclusion that Marks Ridge occupies a section of an older valley of the South Santiam River. If the Stayton Lava is equivalent in age to the Columbia River Basalt, then the South Santiam River valley dates from Miocene time.

Considering the evidence presented above, we must accept the probability that the present topographic development of western Oregon had its beginning in Miocene time. Most of our present principal rivers had their beginnings at that time and the Willamette Valley must have originated by late Miocene or early Pliocene time. Extending our deductions farther, we can postulate with some assurance that some of our early Willamette Valley gravel deposits (other than the Troutdale formation) could easily be of Pliocene age.

Paul W. Howell

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CURIOUS BLIND FISH

A bizarre blind fish, Bathytyphlops marionae, from the depths of the Caribbean, now is being studied by ichthyologists at the Smithsonian Institution. They are working with the only two specimens of this curious creature of the great deeps---2,850 to 3,000 feet--now known, although the species may be fairly abundant in its dark habitat on the sea bottom. It was caught on an expedition of the U. S. Fish and Wildlife Service ship Oregon.

Bathytyphlops lives in perpetual darkness, well below sea depths penetrated by sunlight. One explanation for its peculiarities is that it represents a type, only two species of which are known, which has gone lower and lower to escape competition and over the millenniums has lost some features characteristic of its group.

Says Dr. Giles W. Mead, Fish and Wildlife Service biologist who is working at the Smithsonian: "It is difficult to imagine a free-living fish more degenerate than the species of Bathytyphlops. They are undoubtedly blind, for the eyes are vestigial, covered by skin and occasionally scales. None of the other sensory structures are notably enlarged. The teeth consist of broad, rugose grinding surfaces on most of the jaw and mouth bones.

"These fishes," says Dr. Mead, "cannot be active carnivores. Neither can they be filter feeders, for the gill rakers are reduced to rudiments. They may be carrion feeders although their relatively large size suggests nutritional requirements of some magnitude, and it seems unlikely that carcasses of sufficient size to warrant the large, grinding surfaces are numerous

Curious Blind Fish - cont.

in their habitat." There is some likelihood, he says, that they feed on small mollusks of the sea bottom.

This is the second known species of the Bathytyphlops genus. The first was obtained from the bottom of the Arabian Sea at a depth of about 12,000 feet by the English John Murray Deep Sea Expedition about 25 years ago. Others of the same group since have been found at the bottom of the Indian Ocean east of Africa by the Danish Galathea Expedition.

The present find extends the range of the genus essentially around the world and also brings it into much shallower water. - Smithsonian Institution -

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CAPACITY OF EARTH TO SUPPORT INCREASED POPULATION

The world should support a population of 6 billion in the next century.

This is the calculation of G. V. Jacks, one of Europe's leading soil experts and Director of the Commonwealth Bureau of Soils at Rothamsted Experimental Station. Britain's chief center for agricultural research, in an article included in the most recent Annual Report of the Smithsonian Institution. It depends, however, on a proper organization of the burgeoning society, he stresses. Fertility of the soil must be maintained everywhere, a far more important factor than bringing new land into cultivation

There is a curious relationship between distribution of population and agricultural productivity, Mr. Jacks emphasizes. By and large, land fertility increases with the size of the towns, not with the number of persons engaged in farming. At first, crop land does little more than supply food for the actual cultivators. Little or nothing is left to put back into the land out of which something is taken by each successive crop. Exhaustion comes soon and the people must find new land.

Then a surplus population flocks together to establish towns supported by industries. They require some of the farm products, and this need tends to make agriculture more stationary in the neighborhoods of towns. Actual money flows back to the farmers. They are able to buy fertilizers or apply more effective measures to prevent soil depletion and raise bigger crops.

The process is continuous, Mr. Jacks points out, as long as the industrial centers continue to pour more and more back into the land.

"Towns," he says, "increase a country's soil fertility by enabling farmers to afford to put more into the soil than they take out of it. Fertility cannot be increased merely by getting the soil to take in its own washing."

"Will the world of a hundred years hence be able to feed the 6,000 million people who will then be in it? The answer is yes, provided most of them live in towns and produce enough wealth to pay for the food they need. If they offer enough money for their food the food will be produced."

Smithsonian Institution

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PREDICTIONS OF RAINFALL

Predictions of rainfall for ten years for 30 selected stations scattered over the United States now are being carried out by Dr. Charles G. Abbot, former Secretary of the Smithsonian Institution and now a research associate.

The cyclic variations were first found in solar radiation, a field in which Dr. Abbot is the world's foremost expert. Identical cycles occur in published weather records. The work requires very extensive electronic computations which are being carried out at Arizona State College. The work is partly financed by the Association for Applied Solar Energy, of Phoenix, Ariz.

Dr. Abbot in the past has made long-range rainfall predictions for Albany, Washington, Charleston, St. Louis, Peoria, St. Paul, Omaha, Brownsville, Tex., and Natural Bridge, Ariz.

On the whole these predictions have been quite successful and certainly have revealed general trends. The complications involved in the calculations, however, are very great and results are affected by many strictly local factors.

"It is my intention," says Dr. Abbot in an autobiographic book just published, "after completing this large piece of forecasting work, to draw seasonal maps for each of ten ensuing years in order to delimit over the United States the regions of equal percentage departures from normal precipitation."

He has discovered, Dr. Abbot relates, that the sun's variation of radiation "comprises a master cycle of exactly 23-3/4 years and that there are over 60 exact harmonic periods thereof, such as 91 months, 68-1/4 months, and many others

"Each one of at least a score of these periods in solar variations is reflected by the same period in weather, both in temperature and precipitation. However, the atmosphere changes in transparency and otherwise from time to time, thereby producing lags in the effects of solar changes. These lags differ at different times so much that anyone who would seek to find these periods in weather easily could be disappointed.

"I worked four years on the records of precipitation at Peoria, Ill., before I found all the pitfalls disguising the influence of solar variation. The records of over 1,000 months at Peoria were tabulated 14 times. Eventually it was found that winter, summer, and autumn must be treated separately, times of numerous sunspots must be separated from times when sunspots are few, and tabulations must be made separately before and after 1900 because of changes of buildings, machines, and population."

Essentially this time procedure must be followed for each of the 30 stations with which Dr. Abbot now is working, but with the help of the most modern electronic calculators which were not available for much of his previous work.

Smithsonian Institution

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ARCHEOLOGICAL SITES

More than 9,000 archeological sites--locations of Indian and frontier settlements--have been found in the past 12 years in areas scheduled to be flooded or otherwise obliterated in the present reservoir-building program.

This has just been reported by the Committee for the Preservation of Archeological Remains, an independent group serving in an advisory capacity for the Inter-Agency Archeological Salvage program which is being coordinated by the Smithsonian Institution and the National Park Service. The Smithsonian Institution unit is headed by Dr. Frank H. H. Roberts, Jr., director of the Bureau of American Ethnology. There are five cooperating federal agencies, together with State historical societies, universities, and State museums.

The sites are scattered over 310 reservoir areas in 42 States. They constitute remains of camps, villages, burial mounds and other cemeteries, trails, quarries, and caves used by Indians and trading posts, forts, pioneer cabins, and settlements of white frontiersmen.

Many of the 9,000 sites obviously do not merit excavation, says the report. Those that do, if the work is carried out, "would provide a record of man's achievements in North America over a period ranging from 10,000 to less than 100 years ago."

Excavations have been started to date in 69 of the reservoir areas located in 31 states. From these, and from the surveys which preceeded them, have come more than 4,000,000 archeological specimens. These consist largely of arrowheads, pottery, stone and bone tools, stone ornaments, basketry, metal tools and glass objects. They will be preserved as museum exhibit pieces and study collections at the U. S. National Museum and at State and local museums and research centers throughout the country.

But the major work of the salvage program lies ahead. Excavation schedules in reservoir sites already surveyed include nearly 2,000 sites of major scientific importance.

Smithsonian Institution

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RIVERS WITHIN RIVERS OF METEORS - -

This thesis is advanced by Dr. Gerald S. Hawkins and Richard B. Southworth of Boston University and Harvard College Observatory, in a paper recently published by the Smithsonian Institution Astrophysical Observatory to explain variations observed in different years of the number of "shooting stars" in the Quadrantids. This is one of the annual showers of these objects, believed to be the debris of a disrupted comet whose orbit around the sun intersected that of the earth.

The annual shower of the Quadrantids is observed early in January, usually just after midnight, January 2-3. Presumably this is the time when the orbit of the debris, the same as that of the disrupted comet intersects the earth's orbit. The shower is fairly conspicuous, comparable to the better known Perseids in August and the Geminids in December. Over the past 40 years an average of about 40 per hour has been reported. Rates of more than 50 an hour, however, have been reported, especially before 1921. This has led some astronomers to the hypothesis that the shower is declining, perhaps eventually to disappear altogether.

But, Hawkins and Southworth stress, older naked eye observations without the more adequate instrumentation of the present, probably represented abnormal years when the number was exceptionally high.

This can be explained on the simplest hypothesis, says their report just issued by the Astrophysical Observatory, "of regions of unusually high density in the otherwise nearly uniform distribution of meteors along the orbit of the Quadrantid stream." It is concluded that there are clouds of meteors imbedded in the continuous stream.

The Smithsonian astronomers report evidence that the "node," or point where the Quadrantid orbit intersects the earth's orbit, is regressing slightly each year, due to pull of other celestial bodies. The point of intersection is taken to be the point of the maximum number of meteors observed.

The research was supported jointly by Army, Navy, and Air Force under contract with Massachusetts Institute of Technology.

Smithsonian Institution

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THE MOUND BUILDERS

After 7,500 years as a nomad and food gatherer the American Indian started to "settle down," to live in semi-permanent communities, and to cultivate beans, corn, and squash. Evidence of this revolutionary change in ways of life is found in remains left by the prehistoric Adena peoples of Ohio, West Virginia, and Kentucky. Archeologists have determined that they inhabited the area from about 500 B. C. to A. D. 500. They may have been distant descendants of those original Mongoloid migrants who came from Asia about 10,000 B. C.

This is postulated by Frank M. Setzler, Smithsonian Institution curator of anthropology, after excavation of one of the largest sites of this mysterious people, the so-called Welcome Mound on the Ohio River near New Martinsville, W. Va. The mound was on the property of the Columbia-Southern Chemical Corp., a subsidiary of the Pittsburgh Plate Glass Co. The company generously furnished all the labor and machines required in the excavations. A collection of potsherds and the first reported effigy tubular pipe was obtained for the Smithsonian collections, which throw much new light on the Adena culture.

This group of prehistoric Indians directly preceded the Hopewell mound-builders of the Mississippi Valley. the Adenas remained partially nomads, combining primitive agriculture with the old ways of a hunting-and-gathering life. A characteristic of the Adena people is that they used only local materials, such as stone, bone, and shell. Their culture had not evolved to the level of commerce or widespread travel. The succeeding Hopewell people apparently, based on the excavation of their mounds, explored and carried on trade over most of the North American Continent. They obtained and used obsidian from the Rocky Mountains, possibly Yellowstone, teeth of grizzly bears from the Far West, large conch shells, and barracuda jaws from the Gulf of Mexico.

Still, Mr. Setzler believes, their relatively high culture was a "blossoming out" of that built up by their Adena predessors and new migrations from Asia. The basic culture traits

remained the same. Both shared the ceremonial mound-building complex, although the Hopewell mounds were considerably more elaborate. Both peoples were primitive farmers, but the Hopewells were well on their way to a sort of "civilization." Other evidences might indicate that a somewhat distant relation of the Hopewell may have been the basic element to many diverse cultures.

Until quite recently the Adenas have remained essentially unknown. The principal study of them has been by archeologists of the University of Kentucky and Ohio State Museum--especially Drs. William S. Webb, Raymond S. Baby, and Charles E. Snow. These have made extensive investigations of their remains in mounds, village sites, and Appalachian rock shelters, especially in eastern Kentucky.

Chief knowledge in the past has come from excavations of burial mounds, like the Welcome Mound in West Virginia. Most of the material culture which was not indestructible was partly or completely destroyed by fire. Many artifacts buried with the dead also were destroyed by moisture or by invading tree roots. Burials which escaped cremation often were made in log or bark tombs, in central pits. Preservation of artifacts was limited almost entirely to stone, copper, shell, and similar indestructible material.

Dwellings seemingly were widely dispersed in any Adena community. There was rarely, if ever, concentrated occupation of any small area. The result was that there were no deep village middens with their intimate cultural remains. Some of the rock shelters, however, provided deep ash beds which, being dry and alkaline, preserved some of the organic materials. From these shelters has been obtained much that is known of the Adena people's way of life.

Smithsonian Institution

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DEEP OCEAN CURRENTS KEY TO CLIMATE

Unseen and still largely uncharted currents which circulate in the abyssal waters of the earth may one day provide man with the means for altering world climate according to Henry Stommel, oceanographer associated with the Woods Hole Oceanographic Institution.

"Optimistic promoters of the earth sciences," said Dr. Stommel this week, "hold out visions of turning tropic deserts or arctic wastes into temperate and fertile plains. Of course we could not hope to do this by brute force. To deflect major wind systems or ocean currents, or to heat the outdoors, would call for engineering works on a scale that man cannot even dream of. But some people suggest that we might be able to find some critical time and place where a relatively small man-made disturbance could set off a snowballing reaction which would produce a major alteration in weather patterns--if only we knew enough about the circulation of the atmosphere and the oceans. Actually this prospect is quite remote. It does add some spice, however, to a study such as oceanography.

"We do not know that the oceans circulate, transferring heat from one part of the planet to another. This transfer, we also know, exerts a major influence on the pattern of world climate. We can directly observe surface ocean currents, such as the Gulf Stream. But these comprise only part of the marine circulation. Other currents, equally significant to climate, flow in the abyss--a general sluggish circulation of water along the ocean bottoms from the North Atlantic and the Antarctic to the other oceans. These currents can only be studied indirectly because of the great depths at which they flow. One evidence of their flow is gathered by measuring the amount of dissolved oxygen in the waters of the abyss. Ocean water receives oxygen only at or near the surface--by direct contact with the atmosphere. After surface water sinks to deeper levels it gradually loses some of its dissolved oxygen. Deep water is richest in oxygen in the North Atlantic and the Antarctic where surface water appears to sink rapidly. Deep currents from these areas then seem to flow south and north, respectively, until they meet off the eastern coast of South America where they turn east, enter the Indian Ocean and continue into the Pacific. Deep water of lowest oxygen content is found off Peru at the end of the long trip.

"Now, as to controlling climate, the suggestion has been made that a dam be thrown across the Straits of Gibraltar. Such a dam would need only about 10 times the fill used to build the Fort Peck Dam in Montana. There is a deep current from the Mediterranean into the Atlantic which carries very salty water and helps make the Atlantic the saltiest ocean in the world. If this flow were dammed, the salinity of the Atlantic might drop. This would reduce the density of the water so that the cold Arctic water might stop sinking. Only the Antarctic would then supply the deep, cold ocean currents. In this event, the Gulf Stream would probably be diverted, flowing east instead of north from the Gulf of Mexico. As a result of the reduction of heat transport to the Arctic, the ice packs in that region would grow. This could possibly lead to a decline of the glaciers on land and to a general warming of the earth. (to be cont.)

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1959 - 1960

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Society Objectives

To provide facilities for members of the Society to study geology, particularly the geology of the Oregon Country; the establishment and maintenance of a library and museum of geological works, maps, and specimens; the encouragement of geological study among amateurs; the support and promotion of geologic investigation in the Oregon Country; the designation, preservation, and interpretation of important geological features of the Oregon Country; the development of the mental capacities of its members in the study of geology; and the promotion of better acquaintance and closer association among those engaged in the above objectives.

Persons desiring to become members should contact the Membership Chairman.

Regular annual dues (single or family memberships) are $5 for residents of Multnomah and adjacent counties; $2.50 for others; and $2 for Junior Members. Make remittances payable to the GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Society Activities
(See "Calendar of the Month")

Evening Meetings: Formal lectures or informal round-table discussions on geological subjects, on the second and fourth Fridays of each month at Public Library Hall, S.W. 10th Avenue and Yamhill.

Field Trips: Usually one field trip is scheduled for each month.

Library Night: Once a month. Lewis and Clark College.

Luncheons: Informal luncheons, with geological motif, each Thursday noon in Room B, Chamber of Commerce Building, S.W. 5th Ave. and Taylor St. $1.00 per plate.

Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon, second floor, Portland Chamber of Commerce, 824 S.W. 5th. One dollar.

Friday September 11 — Lecture - Central Library. Dr. Paul Howell, Geologist with Department of Army Corps of Engineers, President of Geological Society of the Oregon Country. Subject: "The Late Tertiary Geology of the Clackamas and Sandy River Area." Illustrated by slides.

Tuesday September 15 — Library Night - Lewis and Clark College. There will be a demonstration followed by a discussion of our program for this year.

Sunday September 13 — Field Trip to Clackamas River Area. The trip will be led by Dr. Paul Howell, who will give special attention to the stratigraphy of this region.
Meet at the Bathing Pavillion just off Route 43 on Lake Oswego. The hour of meeting - 9:00 A.M. Bring lunch.

Friday September 25 — Lecture - Central Library. Speaker - Mr. Hollis M. Dole, Geologist with the Oregon State Department of Geology and Mineral Industries. Subject: "The Structural Significance of Ultra Basic Rocks in Southwestern Oregon."
He will illustrate his talk with slides.

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CAMP HANCOCK

The teen-age Science Camp sponsored by OMSI at Clarno, Oregon closed August 2nd.

This was the ninth year of successful operation. Some 110 enthusiastic youngsters participating, plus 25 grown-ups, such as instructors, Doctors and kitchen help. Elkhart, Indiana boasts the fartherest point from which students were drawn.

Among the notables honoring the camp with a visit, was Dr. R. A. Stirton, Paleontologist from the University of California.

It was Dr. Stirton who identified the small fossil rhinoceros found at Clarno in 1946, the first mammal to be discovered in the Eocene formation of Oregon.

Judging from the amount of good material reported discovered this season such as fossils and minerals, the field is far from being depleted.

The G.S.O.C. and Mineral & Agate Society presented the camp with a new 80 gallon electric water heater, of which the kitchen help considered one of the highlights of the year. They also floored the girls' large tent with concrete.

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-- OUR ANNUAL PICNIC AT MT. TABOR

Look for a full report in our next publication.

Rose Hamilton.

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Our Service Committee Chairman Mr. Davis will be glad to receive information concerning publications of interest to our members.

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DEEP OCEAN CURRENTS KEY TO CLIMATE -(continued from August issue)

"Common sense rebels against such an argument. It is hard to imagine so fantastic an effect from so small an intervention by man. And, indeed, the argument is loaded with unproved assumptions. In fact, I cite this entertaining fantasy only to show that we need a great deal more

information before we can begin to talk knowledgeably about altering world climate. But such speculations illustrate how valuable it would be to develop a better quantitative understanding of such matters as the ocean currents."

Scientific American

REPORT OF FRANKLIN DAVIS, Chairman, Service Committee - -

While there are no constitutional provisions covering the duties of the chairman of the Service Committee, it is generally understood that they require him to keep the membership informed with respect to current publications, maps, etc. pertaining or closely related to the subject of Geology. I am therefore submitting the following list of comparatively recent publications:

Geology of Oregon, by Dr. Ewart M. Baldwin, Professor of Geology at the University of Oregon, 136 pgs, illustrations, and maps - paper. Distributed by the University of Oregon Cooperative Book Store, also J.K. Gill Co. in Portland. Price $2.00.

Field Guide Book to Geological Trips Along Oregon Highways, prepared under direction of Dr. W. D. Wilkinson, Professor of Geology, Oregon State College. Published as Bulletin 50 of State of Oregon Department of Geology and Mineral Industries, 148 pgs, paper. 1959. $1.50.

The Earth Beneath the Sea, by Francis P. Shepard, cloth, 275 pp. 1959. $5.00 net. Published by The John Hopkins Press, Baltimore 18, Md.

The World of Dinosaurs, by David H. Dunkle, Assoc. Curator, Division of Vertebrate Paleontology, U. S. National Museum. Paper, illus., 22 pgs, 50¢, published by Smithsonian Institution, Washington, D. C. 1957.

Early Man in Washington. Paper. 50¢, published by State of Washington Division of Mines & Geology, Olympia, Washington.

Historic Water Levels of Tulelake, California, and Oregon, and their Relation to Petroglyphs, by John C. Cleghorn (Klamath Co. Museum Research Paper No. 1) Paper. 1959.

LIBRARY ADDITIONS - Sept. 1959

The Rocks and Fossils of Glacier National Park - The Story of Their Origin and History

Succession and Speciation of the Pelecypod Aucella

Archeology - Washington

Ringold Formation of Pleistocene Age in Type Locality - The White Bluffs, Washington

Coastal Sand Dunes of Oregon and Washington

Time, Life, and Man

Early Man in Washington

Field Guidebook - Geologic Trip Along Oregon Highways

Historic Water Levels of Tulelake, California - Oregon and their Relation to the Petroglyphs

Geo Times - May - June - July and August 1959

Pleistocene Sequence in Southeastern Part of the Puget Sound Lowlands, Washington

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MOHOLE AGAIN IN THE NEWS
(Please refer back to our June Newsletter)

MOHOLE GRANT -

Columbia University announced last week that it has received a grant of $30,000 from the National Science Foundation to support the site survey for one of the most ambitious scientific projects ever planned--drilling a hole several miles through the earth's crust. The survey is under the direction of Prof. John F. Nafe of Columbia's

Lamont Geological Laboratory, who pointed out that the hole must be drilled through the ocean floor beneath several miles of water. The hole itself, which is expected to give man his first look into the interior of the earth, must be several miles deep to go through the "Moho," or Mohorovicic Discontinuity, named for the Yugoslav scientist who discovered it. The projected hole is therefore known as the "Mohole."

The "Moho" is the boundary between the earth's crust and the mantle, which comprises about 80 per cent of the earth's mass. Within the mantle is the core. Scientists believe that by drilling through the crust they will find material that will provide significant clues to the origin of the earth and the solar system. The ocean has been selected for the "Mohole" drilling because the earth's crust is thinner under the sea than under the continents. North of Puerto Rico, on a slight rise of the ocean floor, the crust is only a few miles thick. Preliminary evidence indicates that the north rim of the Puerto Rico Trench may be found to be the suitable site for the "Mohole."

New York Times

WHITE DWARFS

Based on the article
"Dying Stars"

New York, N. Y., -- Sometime in the distant future, long after the earth has become frozen cinder, the thermonuclear fire which warms our planet will flicker out and the sun will shrink to a dead mass weighing 15 tons per cubic inch, according to Jesse L. Greenstein, an astronomer at Mount Wilson and Palomar Observatories. From then on the solar system will hurtle through eternity eclipsed by darkness, and unknown.

"Here and there among the tens of thousands of stars in the nearby regions of our galazy," said Dr. Greenstein this week, "we can detect a few hundred whose fires have gone out. Once they burned as brilliantly as any we now see in the sky. Some had the 'normal' size and brightness of the sun; some were giants with many times the sun's diameter and brightness. Now these stars are approaching the end of the road. They have exhausted their fuel. The inward pull of gravity, no longer opposed by the outward push of pressure generated by heat within, has shrunk their diameters to a tiny fraction of stellar size, to that of the earth and even smaller, compressing their huge masses to unimaginable densities of many tons per cubic inch. In their fading light, detectable only by the instruments and techniques of modern astronomy, they are radiating the heat still left from the past out into the cold reaches of space."

As living things live and die in countless ways, so stars have many possible deaths, according to Dr. Greenstein. The sun will be no exception, he predicts. Studies indicate that it will continue to support life on earth for another billion years or so. Ultimately, however, when its fuel supply runs low and the furnace cools, its gaseous envelope will shrink. The process of shrinking will compress the stuff at its center, elevating the temperature of its remains to an unimaginable high. The resulting radiation will quickly burn our planet to a crisp. The emission will inflate the dying body temporarily after which the sun will be on its way to inevitable collapse.

Astronomers offer no prediction of how long the death throes will last. "We can only state," said Dr. Greenstein, "that a white dwarf, the name we give to dying stars, takes a long time to expire. As heat escapes, the star's temperature drops and energy is lost at an even slower rate. According to Martin Schwarzschild of the Princeton Observatory, a white dwarf composed mainly of helium takes three billion years to cool from its initial blue-white stage down to a surface temperature of 7,000 degrees in the yellow stage. From yellow to red takes another 5 billion years. But 'red hot' in the stellar sense means 4,000 degrees. From this red to infrared, the star will fade over a fantastic span of time -- large compared to any present estimate of the age of our galaxy.

"But all stars eventually fade to extinction, and so the sun will fade. How will the sky look after our sun's evolution is complete, and our dead planets circulate about a dying star? In about seven billion years the sun will be a hot and very blue-white dwarf, too small to show a disk to the unaided eye on earth. The earth's temperature will be about 300 degrees below

Fahrenheit. The sky at night will no longer be filled with stars, since star formation will have ended and those which comprise our constellations will long ago have disappeared.

"Probably no star will be visible, except for an occasional faint, red one that passes by chance near our dying system. Although the formerly bright stars will have become white dwarfs, they will all be too faint to be seen, and black night will reign supreme. Yet close to one of the faint red stars life might exist on other planets, in forms and for ages unimaginable to us." ------ Scientific American

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THE CHARGED WINDS OF SPACE

Based on the article
"The Tails of Comets"
October 1953 issue

With celestial exploration rapidly approaching reality, at least by unmanned vehicles, astronomers are currently taking a fresh look at some of our near neighbors in space. In addition to the planets and asteroids these include the comets, their tails and the blizzards of electrified particles which help to shape them. Comets in particular appear to provide new insight into the nature of interplanetary space, according to Drs Ludwig F. Biermann and Rhea Lust of the Max Planck Institute for Astrophysics at Munich, Germany.

It was long assumed that outer space was a void and that the pressure of sunlight explained why the gaseous tails of comets always pointed away from the sun. But no satisfactory theory was advanced in explanation of the fact that comet tails vary greatly in appearance from comet to comet The tails have been classified into three main groups. Tails of type I are long and straight; within them there are often threadlike streamers, knots, and other structures. Study disclosed that they consist mainly of charged molecules of gas, carbon monoxide, nitrogen, and the hydrocarbon radical. The tails of types II and III are more or less curved; most of them shorter than the tails of type I. They are fuzzy and have little or no internal structure. They appear to be comprised largely of uncharged gas and dust.

Drs. Biermann and Lust ask: What forces act on comets to produce these varied tail patterns?

"Since all comet tails point predominantly away from the sun," they stated this week. "It seemed reasonable to look for the origin of the forces in the sun itself. Of course the sun exerts a strong gravitational pull on all matter in a comet. But there must also be a repulsive force which pushes the matter in the tails away from the sun. In order to get a clearer picture of how the forces operate, astronomers have measured the acceleration of matter in the tails by means of photography. It now turns out that the acceleration varies with the kind of tail. Type I requires a repulsive force from 200 to 2,000 times greater than the attractive force of the sun's gravitation. Type II requires a force equal to or at most twice the sun's gravitation while type III requires a force even smaller.

"It has long been assumed that the repulsive force was the pressure of light from the sun. Calculations show that this force would be at most a few times greater than the gravitational force of the sun. Thus light pressure can account for the shape of tails as types II and III but not for those of type I.

The evidence now seems strong that type I tails are shaped by winds of charged particles hurled into space by the sun; winds comprised of highly electrified bits of matter numbering up to a million particles per cubic inch and moving at velocities of thousands of miles per hour. The particles appear to be ejected from certain areas of the sun which are marked by relatively dark spots. Studies of old photographs dating back to 1910 show the influence of these winds on the tail of Halley's Comet as the slow rotation of the sun periodically swept a jet of particles through the tail. A wind of 500 billion solar corpuscles per square inch per second would account for the effect."

These are the same high speed particles, according to Drs. Biermann and Lust, which cause the auroral lights and magnetic storms on earth. The possible effect of such winds on space vehicles is yet to be determined. ------ Scientific American

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Compiled by Miss Rose Hamilton

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"Allen, Dr. and Mrs. John Eliot	1162 S. E. 58th Ave., 15, City	BE6-1558
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GEOLOGICAL NEWS LETTER

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1959 - 1960

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Society Objectives

To provide facilities for members of the Society to study geology, particularly the geology of the Oregon Country; the establishment and maintenance of a library and museum of geological works, maps, and specimens; the encouragement of geological study among amateurs; the support and promotion of geologic investigation in the Oregon Country; the designation, preservation, and interpretation of important geological features of the Oregon Country; the development of the mental capacities of its members in the study of geology; and the promotion of better acquaintance and closer association among those engaged in the above objectives.

Persons desiring to become members should contact the Membership Chairman.

Regular annual dues (single or family memberships) are $5 for residents of Multnomah and adjacent counties; $2.50 for others; and $2 for Junior Members. Make remittances payable to the GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Society Activities
(See "Calendar of the Month")

Evening Meetings: Formal lectures or informal round-table discussions on geological subjects, on the second and fourth Fridays of each month at Public Library Hall, S.W. 10th Avenue and Yamhill.

Field Trips: Usually one field trip is scheduled for each month.

Library Night: Once a month. Lewis and Clark College.

Luncheons: Informal luncheons, with geological motif, each Thursday noon in Room B, Chamber of Commerce Building, S.W. 5th Ave. and Taylor St. $1.00 per plate.

Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon, second floor, Portland Chamber of Commerce, 824 S.W. 5th. One dollar.

Friday October 9 — Dr. Paul Howell, Geologist with the Army Corps of Engineers and President of our Society, will continue his talk on the GEOLOGY OF THE CLACKAMAS - SANDY RIVER AREA. His talk will be illustrated with new color slides and emphasis will be on the Geologic history of the area.

Tuesday Oct. 20 — Library Night. Members will display their fossil leaf collections and these will be compared to collections from living specimens. Anyone having an unidentified leaf, please bring it to the meeting. Meetings are held on the 3rd Tuesday of each month at the Lewis and Clark College Biology Building and begin at 7:30 p.m.

Friday Oct. 23 — Mr. Francis E. Murphy, feature Editor for the Oregonian "Behind the Mike" column, will give a talk on visiting MAYAN RUINS in YUCATAN. Each year Mr. Murphy makes a trip to this area. His talk will be illustrated with slides taken on his last trip.

Sunday Oct. 25 — Field trip. (See below.)

* * * * * * *

DR. JOHN HAMMOND NEW LIBRARY NIGHT CHAIRMAN - - -

At Library Night September 15 our president Dr. Paul Howell suggested Dr. John Hammond as program chairman for library meetings. Suggestions from the floor included Bob Wilbur and L. G. Lloyd, both of whom declined. Also Leo Simon who was absent but comments indicated he is already too busy to take on any additional responsibilities. Whereupon Emily Moltzner moved that Dr. Hammond be appointed chairman; seconded by Ardna Brown. Motion carried. Numerous offers of help came from various members, with study of present day and fossil leaves set for early programming. Those interested in gathering leaves for this project will meet at Hoyt Arboretum for a special field trip Saturday, October 17 at 9:00 a.m.

OCTOBER FIELD TRIP

Meet Sunday, October 25th, at Portland State College. - Time: 8:30 a.m. Bring your lunch, binoculars, picks, and topographical maps of the Hood River, Camas and Bridal Veil Quadrangles. Also bring your copy of Dr. John Allen's Columbia River Gorge Field Guide Book. This will be a Greyline bus trip through the Columbia River Gorge and Bonneville Dam area, east to Wind Mountain. The bus is equipped with a speaker system and we will see and learn of the Missoula Flood deposits, Eagle Creek formation, Cascade slide area, and also have dated and explained the Bridge of the Gods.

Ralph Mason and Paul Howell will be co-trip leaders, and it is certain that you will find this to be a very informative and excellent trip. Round trip costs will be $2.00 per person.

Respectfully,
Franklin Brown, Trip Chairman.

* * * * * * * * * * * * *

NEW MEMBERS

Mr. and Mrs. Fred A. Lucus, 6171 S.W. Harrington, Lake Grove, Ore. NE6-1896
Mr. and Mrs. Emory E. Johnston, 2030 N.E. 57th, Portland 13, Ore. AT1-3041

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Miss Almeda Smith, 8807 S.W. Capitol Highway, City (19)

GSOC FIELD TRIP TO THE MCKENZIE AREA
23 August 1959

The McKenzie Pass Field Trip party met at McKenzie Bridge on Saturday afternoon as scheduled; those "roughing it" camped at Paradise Camp four miles above the bridge, and the rest took advantage of the numerous fine resort-motels of the area. The trip leaders were Franklin Brown, Leo Simon, and Douglas Williamson, a geologist from the Eugene area.

The remaining portion of Saturday was spent considering the evidence establishing the westward extent of the Pleistocene valley-glaciation of the Upper McKenzie River and in taking a brief trip along Cougar Reservoir to get acquainted with the rock types of the Western Cascades. The problem of structure as related to the Western Cascades has been debated for many years, with the controversy of "initial dip" versus "deformation" having finally reached an impasse'. Recent investigation of the rocks of Cougar Dam Site has disclosed several major faults, and the "folding" of the rocks of the Western Cascades is thought bo be accomplished by minor fault displacement extending over long distances.

Although the present McKenzie River is down-cutting in bedrock at numerous places locally, drilling by the Corps of Engineers has shown the valley alluvium to be over 100 feet deep in selected areas of investigation. This uneven character of the former valley floor is not characteristic of normal river erosion but is more closely related to glacial erosion.

The difficulty of recognizing glacial features was discussed, especially the relationship between directly deposited glacial debris versus outwash and landslide material. Since it has been established that there was a period of aggradation at the end of the Pliocene, as evidenced by the deposition of the Troutdale gravels, abundant alluvial materials probably also were present in the Cascade valleys at that time. This alluvial material, composed of rounded gravels and boulders, partially filled the valleys prior to the initiation of glaciation. Furthermore, Blackwelder (1931) has shown that the advances of alpine glaciation corresponded with the advance and retreat of the continental glaciers which produced an intermixing of the outwash and till of each succeeding stage. This intermixing produced till-like deposits that cannot be distinguished as to origin on a basis of angularity. The presence of rounded gravels, therefore, should not preclude the identification of glacial-like deposits as till.

Exploratory drilling and reconnaissance by Corps of Engineer geologists has shown that such till-like deposits exist in the McKenzie drainage. It has also been established that extensive deposits of varved silts exist in the valley of the South Fork of the McKenzie as well as that of Blue River. These silts indicate quiet water deposition that would be found in morrainal or ice dammed lakes. The base of the silts does not conform with the present river valleys but varies from below river level to two hundred feet above it. The silts are similar in character to those found in the Detroit Dam Reservoir area and described by Thayer (1939).

It has further been found that Blue River and the South Fork of the McKenzie, as well as other tributaries, were diverted from their original established courses. The South Fork of the McKenzie was able to re-establish its course, but Blue River "jumped the divide" to the west and now joins the McKenzie River via the ancestral Quartz Creek drainage. A deep fill of more than 100 feet now occupies the former valley where Blue River joined the McKenzie River some five miles upstream from its present mouth. Whether these diversions were produced by volcanic or glacial processes awaits further investigation.

The party met at 8 AM on Sunday and proceeded eastward over the scenic and historic McKenzie Pass. Although the party was mainly considering geologic features, we took time to consider the "lost wagon train" that traversed the pass in pioneer times. It is difficult to imagine how wagons could cross so rugged a terrain. The wagon train followed the south side of the canyon while the present highway follows the north side.

The first stop was at Alder Springs which in former times was used to fill the overheated radiators of early day automobiles. The diverse physical character of the road cuts emphasized the violent activity that occurs within a lava flow at the time of its evolution. The open, scoraceous character of the rock demonstrated the high permeability, which was further evidenced by deposits of soluble salts on the rock surfaces.

The next stop was at the McKenzie Pass Summit, and, although most of the party had seen it before, the austere beauty of the contrast between snow-clad, white peaks and the raw, rugged, black lava plains, did not fail to impress the viewers. Most of the peaks showed evidence of the

Field Trip to McKenzie Area - cont.

dry year we are experiencing in Oregon and did not have their customary snow cover. Mount Washington, in particular, was unfamiliar due to its "nakedness". The standard tourist question was mentioned to the enjoyment of all. "Why did the lava flow stop at the highway?" The simultaneous eruption of two flows, one from little Belknap and the other from the flanks of the North Sister, which mingled near the monument; the abrupt boundaries of the islands or steptoes; and the lack of glaciation were given special consideration.

It should be emphasized that this is one of the few areas in the world where a student of volcanology can stand on a vantage point and view multiple textbook features, such as cinder-cones, a shield volcano, a lava dome, a lava plateau, or a caldera.

The party next continued east and paused briefly at Sisters, Oregon to consider the characteristic change of dip of the typical High Cascade flows to the east, and to dwell on the prodigious amounts of fluvio-glacial material that form the flat, even, gentle sloping, farm land of this productive region.

At Suttle Lake the party again examined glacial evidence in the morrainal deposits of the road cuts. A brief dissertation on the difficulties of recognizing the various rock types in the field, especially basalts and andesites, was given.

Although the excellent camping facilities at Clear Lake were crowded with the usual summer visitors and fishermen, the party managed to have lunch there. A discussion arose concerning the dating and origin of the Lake. Leo Simon urged the party to take a boat trip and investigate the source of the lake water, large springs issuing from beneath the lava flows on the east side of the lake. Due to time considerations it was decided to proceed to the Upper Falls of the McKenzie instead. The age of the lake has been inferred to be related to the drowned trees still standing on its bottom (Stearns, 1929), but some consideration should be given to the manner in which the high permeability of the underlying lava flows may affect this age determination. The high permeability of the underlying lava would make necessary an accumulation of fines before any water would be retained in the lava-dammed basin. This would seem to indicate that considerable time could take place between the emplacement of the lava dam and the subsequent drowning of the trees.

One of the highlights of the trip was watching Leo Simon trying to catch a butterfly for examination while being literally surrounded by a cloud of the beautiful insects. He finally accomplished the feat.

Only the Upper Falls of the McKenzie was visited since the road below this point is still under construction and extremely rough. The amount of water flowing over the falls was surprising, considering the dryness of the season. A resistant lava flow forms the lip of the falls and an incompetent underlying interbed is producing a continuous retreat by undersapping. This beautiful falls will not be affected by the City of Eugene's Carmen Smith Project, and the new all-weather road now under construction, connecting the McKenzie and Santiam highways, will allow more people to enjoy the whole areas' scenic wonders.

Due to the rough and uncertain character of the road, the party dispersed, the main group returning by way of the North Santiam and Detroit Dam. The author feels that, although the more spectacular scenery of the High Cascades was examined, more time should be spent in the Western Cascades and a field trip with that in mind should be planned in the near future.

D. A. Williamson, Geologist

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MOHOLE

The National Academy of Science announces a Committee Report has been submitted in which Mohole may cost $15,000,000. This means a proposal to drill a hole six miles deep on the ocean floor. Test holes must first be made, and the project will take about four years. No drill site has been selected.

How deep is the sea? An old, old question. It is now agreed some spots are six miles deep, a good place for Mohole. Yes, and some bright chap has said if we level the continents into the sea the earth would have a mantle of water covering all 12,000 feet deep. Wait Joe! Let's not try that!

DR. JOHN E. ALLEN HONORED

Friends of our own Dr. Allen will be glad to know that he has been asked to become a member of the Yorkshire Geological Society of Durham, England.

The Yorkshire Geological Society was founded in 1837 and has issued the Proceedings since 1840. It is thus the fourth oldest geological society in Great Britain, and it is appropriate that its first Honorary Member was William Smith, the father of English geology. The Society has for many years published papers on a very wide range of geological subjects; the geographical aspects of these have ranged from Scotland to Texas, and the contents from systematic and micropalaeontology to studies in geophysics and mineralization. Especially important have been papers on the Carboniferous, Jurassic and Pleistocene formations so well exposed in the north of England. The Society is proud to have among its volumes a pioneer work that gave a new turn to Carboniferous stratigraphy: that by Mr. W. S. Biset on "The Carboniferous goniatites of the north of England and their zones".

9/13/59 -- GEOLOGIC FIELD TECHNIQUES IN NORTHWESTERN OREGON

by

R. Kenneth Dodds

INTRODUCTION

This paper is one of a series of three to be written on the subject of field methods and techniques, and is the result of a discussion among Paul Howell, John Allen, and the writer concerning the varied techniques necessary to meet differing field conditions in Oregon.

On first encounter it would seem that the earth has concealed most of the geologic mysteries of Western Oregon in an impenetrable mantle of dense vegetation, for many of the slopes are covered by a mid-latitude rainforest that can rival anything found in tropical jungles. But, while this vegetation presents additional problems to the development of the geology of the area it does not make this development impossible. It merely requires a change in emphasis on proven geologic techniques. Exposures are small and widely separated, thus prohibiting the visual mapping of structural features such as faults. Contacts between formations are seldom seen, and when rock exposures are found, many are so deeply weathered that they bear little resemblance to the original rock type. Landsliding plays such a major role in the land shaping process that often there is the doubt that the exposure is in place.

The writer has been engaged in a personal geologic mapping project in Clatsop County for the past four years and has had to live with these problems and many other inhibitants to successful geologic mapping. It is from this experience that the techniques in this paper are derived. By no means is it felt that the methods described are the only components of an approach to these problems. In many cases they may not even be the best, but they are set forth here to give someone working in the area for the first time a place to start in his development of field techniques which will fulfill the needs of his own project.

PRELIMINARY PREPARATION

Many of the areas that it is necessary to visit in geologic mapping in Northwestern Oregon are reached only after many hours of difficult hiking. It is therefore imperative that the early preparation be complete so that all of the information desired will be collected on the first trip. This preparation should include:

1. A thorough study of all previously published work about the area.
2. A familiarization with the access and the general trafficability of roads throughout the area.
3. A schedule of the results desired, the work to be done, and the equipment necessary to perform the work.

To aid the reader in acquiring a geologic background, the following list of the U. S. G. S.

Geologic Field Techniques in Northwestern Oregon - cont.

geologic maps presently published which cover Northwestern Oregon is included. A detailed bibliography will be found with each of these maps.

Baldwin, E. M., (1947) Geology of the Dallas and Valsetz quadrangles, Oregon, Oreg. Dept. Geol. and Min. Indl, Bull. 35, 61p.

(1955) Geology of the Marys Peak and Alsea quadrangles, Oregon, U. S. Geol. Survey Oil and Gas Inv. Map OM 162.

(1957) Geologic map of the lower Siuslaw River area, Oregon, U. S. Geol. Survey, Oil and Gas Inv. Map OM 186

Baldwin, E. M., and Roberts, A. E., (1952) Geology of the Spirit Mountain quadrangle, northwestern Oregon, U. S. Geol. Survey Oil and Gas Inv., Map OM 129

Baldwin, E. M., Brown, R. D., Gair, J. E., and Pease, M. H., Jr., (1955) Geology of the Sheridan and McMinnville quadrangles, Oregon, U. S. Geol. Survey Oil and Gas Inv., Map OM 155.

Snavely, P. D., Jr., and Vokes, H. E., (1949) Geology of the coastal area from Cape Foulweather, Oregon, U. S. Geol. Survey Oil and Gas Inv. Prelim. Map 97.

Vokes, H. E., Norbisrath, Hans, and Snavely, P. D., Jr., (1949) Geology of the Newport-Waldport area, Lincoln County, Oregon, U. S. Geol. Survey Oil and Gas Inv. Prelim. Map 83.

Vokes, H. E., Snavely, P. D., Jr., and Myers, D. A., (1951) Geology of the southern and southwestern border areas, Willamette Valley, Oregon, U. S. Geol. Survey Oil and Gas Inv. Map OM 110.

Vokes, H. E., Myers, D. A., and Hoover, Linn, (1954) Geology of the west central border area of the Willamette Valley, Oregon, U. S. Geol. Survey Oil and Gas Inv. Map OM 150.

Warren, W. C., Norbisrath, Hans, and Grivetti, Rex, (1945) Geology of northwestern Oregon, west of the Willamette River and north of latitude 45°15', U. S. Geol. Survey Oil and Gas Inv., Prelim, Map 42.

General access is best obtained from current U. S. G. S. topographic maps, and detailed access from U. S. or State Forest Service maps, or the haul road maps of private logging companies.

Because of the capricious nature of the climate, the effective field season in Western Oregon is short, from May to October with only part of July, August and, if you are lucky, part of September available for collecting stratigraphic sections in the stream beds. This short field season is another reason for the necessity of effective planning.

The equipment needed for work in this terraine includes;

1. Sharp machete and case--a long thin blade like a cane knife has been found the most effective.
2. Rock hammer--a leather sheath for the hammer has been found very useful.
3. Field maps. (USGS topographic maps preferable).
4. Brunton or similar type of compass.
5. Cold chisel.
6. Biology pick.
7. Field book and hard lead pencils (3 to 9H).

8. Hand lens.
9. Sample bags.
10. 50 foot tape.
11. Small camera.
12. Shoes or boots that can stand getting wet. The writer prefers basketball shoes or waders.

In addition the writer carries:

1. An ankle wrap (always good to have when out in the field in case of a sprain).
2. A scale and protractor.
3. A 5" slide rule to compute strata thickness.
4. Colored pencils to mark on maps.
5. A 20 power hand microscope.
6. A felt tip pen for marking samples.
7. This equipment is arranged in an engineers vest and a small Swiss ski pack.

Other pieces of special equipment may be found necessary for individual jobs, but with the above listed equipment, one can adequately operate on a detailed geologic reconnaissance.

IN THE FIELD

"Where is the rock?" Until one becomes familiar with the country, this is sometimes a frustrating question, for it is possible to walk all day and not see a useful rock exposure. Conversely, by proper planning, it is also possible to walk for many hours in nearly continuous exposures. The best place, and the one in which the freshest rock can be found, is in stream beds and along the cut banks. Many streams run with over 50% of their courses in bedrock. However, the use of these exposures is limited to a very short field season when the streams can be waded. and, on the smaller ones, much work with a brush knife is often required, as the channels are usually overgrown with dense vegetation. The correlations between the geologic sections as exposed in the streams is the best method found of interpreting the geologic history and structure of an area. This interpretation is supplemented by information gained from exposures found in road cuts and along the beaches. Most road cuts less than 30 feet deep expose only deeply weathered rock in which most identifiable correlating evidences have been destroyed. However, with patience, it is possible to develop methods of placing many weathered exposures in an approximate location within the geologic column. The writer uses the remains of certain arenaceous foraminifera and the siliceous inner chambers of a few calcareous foraminifera, both of which seem to have the best resistance to weathering. One other possible location for rock exposures exists; this is over the break in slope on a hillside about one sixth of the distance down from the top of the hill to the bottom. These exposures are limited to the more resistant igneous rocks. A few peaks are also composed of exposed igneous rocks, as at Saddle Mountain and Sugarloaf Mountain.

As a result of the scattered occurence of good rock exposures, the most workable approach to geologic mapping has been found to be the concentration upon stratigraphy. This means that the most important field problem to be solved is the development of a workable, detailed stratigraphic column. This has to be done by the piecing together of many short stratigraphic sections. To be of real value, this must include not only recognizable criteria for formational units, but also the sub-division of each formation into zones. If your particular area of interest is small (a 15-minute quadrangle or less) the adequate establishment of this section will probably require trips outside the mapped area. Many different criteria are available for establishing this section: lithology, mineral analysis of sands, megafauna, stratigraphic position, etc., but the writer has found the most useful to be foraminiferal zonation. In fact, one half of the time spent in the field is used to collect stations and sections from which to establish a foraminiferal zonation in the area to be mapped.

SUMMARY

1. The best approach to geologic mapping in Northwestern Oregon is through the collection and correlation of sections exposed in the rivers and streams. This requires wading the streams, and a compact field kit in an easily carried pack that contains all of the equipment to be used.

2. Because of the short season in which the streams are wadeable, detailed planning is necessary to gain the most information in the time available.

Geologic Field Techniques - cont.

3. Working out the stratigraphic relationships between rock exposures offers the best method for interpreting the complete geologic history.

* * * * * * * * * * * *

RECENT EARTHQUAKES IN MONTANA

Late on the night (11:45 p. m.) of August 17th and early in the morning (3:52 a. m.) of August 18th M. S. T. two powerful earthquakes and a great many after shocks occurred at Hebgen Dam and Lake on the Madison River in southwestern Montana, near the small town of West Yellowstone. They were first estimated to have an intensity of 8 on the Richter scale. but this was later revised downward to about 7.1. Even at 7.1 the shocks were among the most severe occurring on the North American continent in recent times. According to the U. S. Geological Survey at Denver the quakes were apparently caused by a major movement along a very large fault that was known to have existed along the western side of the Madison River. Hebgen Dam is an 87-1/2 foot earth-fill dam with a concrete core and was erected over thirty years ago. Although the quake caused the dam to drop on the northern end and rise on the southern end it remained intact but some three to five cubic feet per second of water is leaking through four fractures in its core. As a result of the quakes three separate geologic phenomenon were initiated almost simultaneously with very tragic and disastrous consequences. The first was a 20 foot wall of water which surged over the dam when Hebgen Lake was actually tilted from its former position due to its north shore being lowered and its south shore being raised. The second was the opening of a huge fissure some 6 to 10 feet wide and some 40 miles long, along with numerous lesser ones. The principal one runs from the dam around the lake (A 15 mile reservoir behind the dam.) and on toward West Yellowstone. Third was a massive rock slide about seven miles downstream and several lesser ones which occurred when the top and side of an unnamed 8,700 foot mountain peak crumpled and, in the form of large boulders and rock debris, slumped into the Madison River canyon.

The great geologic forces, culminating in the three events described above, killed eight people and injured 50, many of them critically in the Rock Creek campground at the base of the mountain. In addition to the human loss, there were some 40 cars and trailers destroyed. and several summer homes demolished. According to several reports, extensive damage was done to many buildings outside the immediate area. Huge sections of Montana State Highway No. 1 were also cracked and torn to pieces, and many other highways were blocked with debris and collapsed bridges. Besides jolting the immediate area, the initial shocks shook a wide region extending from Vancouver, B. C. on the north to Salt Lake City on the south and from western Oregon on the west to the Dakotas on to the east. The enormous rock slide blocking the Madison River (It flows north at this locality.) has created a natural dam rising 250 to 300 feet above normal stream level. Behind it the waters of the Madison River have risen rapidly and formed a second artificial lake. However, it is believed the lake will not become so deep as to be dangerous to those people who live further downstream, for the river is still flowing beneath and through the tremendous pile of boulders, rock debris and earth. If it did not there would be the eventual possibility of a huge wall of water sweeping down Madison River Valley destroying everything in its path.

As students of geology we know that the physiographical features of the earth are incessantly changing, but usually these changes are so slight that we have a tendency to minimize them. As a consequence we are prone to think of the landscape as existing unchanged since the beginning of time. This recent seismic disturbance in southwestern Montana, however. definitely shows that those changes are taking place right now, before our very eyes.

Since the writing of this report, the writer has learned that another sharp quake has occurred in this area resulting in still more rock slides. These last slides are thought to be a threat to some summer homes, but the homes are believed to be vacant.

T. Herbert Laurence - G. S. O. C.
August 25, 1959

THE AGES OF THE STARS

Contrary to the biblical suggestion that all heavenly bodies came into being simultaneously at some remote moment of creation, astronomers now agree that the sky is populated by objects of all ages, from very ancient stars to those still in the process of birth. "Within the past 15 years," said the British astronomers Margaret and Geoffrey Burbidge this week, "our picture of the age and character of the stellar population has undergone some significant revisions.

"The first clue to wide differences in the ages of the stars," they stated, "came some 15 years ago when the Dutch astronomer Walter Baade detected a pronounced difference between the nature of stars which occupy the nucleus of spiral nebulae and those found in the spiral arms of such nebulae. Those found in the arms include bluish white stars with surface temperatures ranging up to 30,000 degrees, the brightest of which shine with a brilliance of 100,000 suns. Such stars cannot be very old because they consume their fuel at a rate which leads to early extinction. Most of the stars close to our sun are of this young, hot type. In contrast, the nucleus of our galaxy is populated by large, cool, slow 'burning' stars which Baade concluded were old. These are some 50 to 100 times fainter than the youngest stars and show surface temperatures on the order of only 3000 to 4000 degrees. Their color is distinctly red. Baade designated the young, hot stars as 'Population I' and the older, cool ones as 'Population II.'

"Subsequent examination discloses that this system of classification is an oversimplification. Actually, it appears that spiral galaxies are merely the most prominent part of a local star system which is spherical in shape. The spiral member lies at the center of the sphere. One theory holds that all stars derive from an initial cloud of hydrogen gas, spherical in shape, which collapses under its own gravitational field. As it begins to shrink, stars or clusters of stars condense from the gas As the shrinking continues some new stars form, exhaust their supply of hydrogen and explode. The 'ashes' (in the form of heavy elements) enter the cloud. The speed of rotation increases as the cloud shrinks but the shape of the cloud at any epoch is preserved by the orbits of stars formed at that time. Hence, the oldest stars might be found anywhere within the region initially occupied by the cloud of gas. Stars formed later would be restricted to the region occupied by the shrunken cloud. Thus the region of the galaxy in which a star is observed forms one index of its age. It chemical composition can be taken as another. The composition of old and relatively cool stars should show a preponderance of hydrogen whereas those of recent vintage should reveal traces of the heavy elements manufactured by the nuclear processes of stars which completed their life cycles at an earlier stage of the galaxy's evolution. Such chemical differences are indeed observed; the brighter, hotter, younger stars showing progressively broader ranges of chemical composition.

"Clearly we have only begun to understand the problem of stellar ages. When we learn how to classify all of the stars that we can observe we shall know a great deal more about the history of the universe. Many different branches of astronomical research are at present converging on the problem of the life histories of the stars. But the concept of stellar populations originated by Walter Baade, now being broadened and extended, remains the key to all the approaches."

--- Scientific American

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REPORT OF SERVICE CHAIRMAN, FRANKLIN DAVIS --

Earthquake History of the U.S. Part 1. No. 41-1. This is a revised edition thru 1956 of Pub. No. 1 & 9 issued in 1951. For the first time Oregon and Washington are included in this record. The purpose of the publication is to cover the more important quakes of the U.S. exclusive of California and Nevada, from the earliest time to the close of 1956. The whole of the continental U.S. is now covered, including Alaska. This publication includes only those quakes with an intensity of 5 on the mod Mercalli scale. Published 1958 by Govt Printing offices. Price 60¢. PO Lib call No. 5512 U58, 1958.

Algae, the Grass of Many Waters, by L. H. Tiffany, Ph.D. Professor of Botany, Northwestern University. 1958. Pub. by Chas. C Thomas, Publisher, Springfield, Ill. The new edition has an added chapter on Algae & Research. Of particular interest to the geologist is Chapter X on Algae of the Past. PO Library Call No. 589.3 T5a2.

GEOLOGICAL NEWS LETTER

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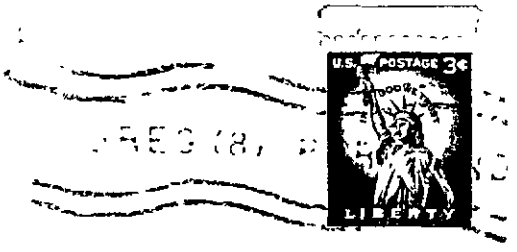

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Dept. of Geology & Mineral Industries
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1959-1960

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Society Objectives

To provide facilities for members of the Society to study geology, particularly the geology of the Oregon Country; the establishment and maintenance of a library and museum of geological works, maps, and specimens; the encouragement of geological study among amateurs; the support and promotion of geologic investigation in the Oregon Country; the designation, preservation, and interpretation of important geological features of the Oregon Country; the development of the mental capacities of its members in the study of geology; and the promotion of better acquaintance and closer association among those engaged in the above objectives.

Persons desiring to become members should contact the Secretary.

Regular annual dues (single or family memberships) are $5 for residents of Multnomah and adjacent counties; $2.50 for others; and $2 for Junior Members. Make remittances payable to the GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Society Activities
(See "Calendar of the Month")

Evening Meetings: Formal lectures or informal round-table discussions on geological subjects, on the second and fourth Fridays of each month at Public Library Hall, S.W. 10th Avenue and Yamhill.

Field Trips: Usually one field trip is scheduled for each month.

Library Night: Once a month. Lewis and Clark College, Biology Bldg.

Luncheons: Informal luncheons, with geological motif, each Thursday noon in Room B, Chamber of Commerce Building, S.W. 5th Ave. and Taylor St. $1.00 per plate.

Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon, second floor, Portland Chamber of Commerce, 824 S.W. 5th. One dollar.

Friday November 13 — Meeting **GESOC**
Dr. Ruth E. Hopson, Associate Professor of General Sciences, Portland Extension Center of the State System of Higher Education, and Mr. Robert L. Brown, Deputy State Conservationist of the United States Soil Conservation Service, will present a program on the
SAND DUNES OF THE OREGON COAST
The program will include a discussion of the Geology and other natural history of the Dunes. The talk will be illustrated with colored slides and a short colored movie.

Sunday November 15 — Field Trip
Meet at Marquam at 10 a. m. This is a continuation of Dr. Howell's series on the Molalla, Clackamas and Butte Creek formations. Trip leaders: Dr. Howell and Murray Miller. Bring lunch, picks and rain gear. Round trip about 100 miles.

Library Night.
The study of fossil leaves will continue under the leadership of Dr. Hammond.

No Meeting ---- Nov. 27

NEWS OF MEMBERS

With sincere regret we announce the passing of another of our Charter Members. Miss Glenna M. Teeters.

Miss Teeters taught chemistry at Jefferson for 37 years and had been head of the science department for four years. She taught at the school until this February, when ill health halted her career.

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Mr. Clair Pense has just been elected president of the Professional Land Surveyors of Oregon.

Mr. and Mrs. Rudolph Erickson have just completed a two-week vacation trip through California, Arizona and Utah.

NEW MEMBERS

Mr. and Mrs. Vernon C. Newton, Jr.	7313 S.W. 52nd Ave., Portland 1, Ore., CH4-9192
Mr. and Mrs. Truman Murphy	1019 S.W. Morrison, Portland 1, Ore., CA7-3253

FIELD TRIP - OCTOBER 25

Some 70 of our members and friends made this journey employing two busses. Picnic lunches were eaten at Bonneville Dam, then crossing the dam the trip ended at Wind Mountain.

Trip leaders, Dr. Howell and Mr. Mason provided perfect weather.

ANNUAL PICNIC

CELEBRATING THE FACT WE ARE IN OUR TWENTY-FIFTH YEAR

Under the efficient leadership of General Chairman Rose Hamilton and Food Chairman Mrs. Franklin Brown, the arrangements for the twenty-fifth annual banquet of G. S. O. C. were so perfectly worked out that the two-hundred (more or less) members and guests enjoyed the occasion immensely. The picnic was held at a place appropriate for a geological society---the crater picnic grounds of Mt. Tabor Park, and the time was Friday evening, August 14th, 1959.

Besides great quantity of edibles eaten by the group it is reported that five pounds of coffee, made potable by the Society's teachers, expert coffee makers, and forty small cartons of milk were consumed. Not a single gripe about the quantity or quality of food or drink was heard; and we have no record of the number of baskets-ful of food that were carried away.

After supper the crowd moved to the out-door theater, where under the direction of President Dr. Paul Howell each of the former presidents was allowed to boast of the society's accomplishments under his administration, bringing back to the minds of old-timers many educational and interesting events. Then President Howell put on a "guessing contest", or perhaps it was an examination, to determine who, and how many of the members present really knew what the country's early geologists looked like. President Howell assembled "stand-ins" representing geologists of the past, and as he read short sketches of the exploits of the old-time scientists, the audience was asked to guess from his reading, and from the appearance of the bearded "exhibit 'A'", the name of the person described. Prizes were given to the first person making a correct identification.

Dr. Arthur C. Jones, as usual, led the singing.

PUBLICATIONS

OREGON 12,000 YEARS AGO- -- (From the Oregonian)

"For variety and abundance of Indian artifacts, no area in the United States exceeds the Columbia River." This is the statement of Emory Strong, Oregon engineer and amateur archeologist, who probably knows as much as any person living about the pre-Columbian Northwest. He has acquired his knowledge the hard way, and he now shares it in Stone Age on the Columbia River (Binnfords & Mort, 254 p., $3.95).

Here for the first time are gathered the known facts and the logical assumptions about the history of man in the Oregon country, from an estimated 12,000 years ago until the coming of the earliest European explorers. It is the least known and perhaps one of the most significant chapters of the Oregon story.

RESOLUTION

Re: The Proposed Round Butte Dam

WHEREAS The Cove Palisades State Park is an unique geological wonder of magnificent grandeur and is visited and enjoyed annually by 60,000 visitors; and

(more)

WHEREAS Portland General Electric Company has made application to the Federal Power Commission and to the State of Oregon for license to construct a 440-foot high dam at the Round Butte site on the Deschutes River immediately downstream from the confluence of the Deschutes, Crooked and Metolius Rivers and which dam would create an artificial lake extending approximately 11 miles up the Metolius arm, 8 miles up the Deschutes arm and 6 miles up the Crooked River arm, and which would completely inundate the park facilities at Cove Palisades State Park and would also inundate and fill a large part of the canyon, and the unattractive fluctuating shoreline of which would impair its usefulness for recreation, therefore

BE IT RESOLVED that the Geological Society of the Oregon Country go on record as opposed to the construction of the Round Butte dam and to the granting of a license by either the Federal Power Commission or by the State of Oregon Water Resources Board: and

BE IT FURTHER RESOLVED that a representative of this organization be designated and authorized to appear at hearings before the Federal Power Commission and/or the Oregon Water Resources Board to state the position of this Society.

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(This resolution was passed by the Board of Directors and approved by the membership of Geological Society of the Oregon Country September 25, 1959.)

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OUR ANCESTORS

The geologist is ever intrigued by fossilized bones he finds in rock formations. Again a new "missing link" of prehistoric man makes the headlines. We have already had Java Man, Peking Man, Neanderthal Man and now "East African Man". This one claims to be a mere 100,000 years older than those mentioned above--that is, 600,000 years.

Dr. Louis B. Leakey, noted British Anthropologist, has made this latest find in Tanganyika. These fossilized bones were buried some 300 feet, along with the crude implements he was thought to have used. Dr. Leakey is quite certain his finding is humanoid and his dating is being checked through the potassium 40 test by the University of California.

ONE OF MAN'S OLDEST DWELLINGS DISCOVERED

Based on the article "Shanidar Cave"

One of the decade's sensational archaelogical finds came to light this week when Ralph S. Solecki, a graduate student of Columbia University, announced the discovery of the remains of Homo sapiens' predecessors in an obscurely located cave in Iraq. The cave, which currently provides shelter for a clan of Kurdish goatherds, has been inhabited for at least 100,000 years! Known locally as the "Cave of Shanidar," it is a high-vaulted natural cave about the size of four tennis courts, capacious enough to house a considerable band of people.

"The inhabitation of the Shanidar Cave," said Solecki, "apparently goes back at least 100,000 years. Remains unearthed from deep beneath its trampled floor give evidence

that Neanderthal man once lived here, and that the cave has been a home of man more or less continuously for something like 3,000 generations.

"Rarely do archaeologists have a chance to see so clear a succession of man's development over so long a period. Interest is not lessened by the fact that Shanidar Cave is close to the birthplace of the first great civilizations in Mesopotamia.

"In 1951, while working in Iraq with a University of Michigan expedition, I heard about the cave and decided to stay on, after the expedition went home, to do some exploratory digging in it. These first soundings were so promising that I decided to return in 1953 and again in 1956.

"In three seasons of work we have cut down through a small area in the center of the cave to the full depth of the cave's earthen accumulations, and have sifted about a tenth of the total bulk of its deposits. The excavations have yielded a rich record of human occupation. We found four main layers, each distinguished by soil color. The first, a greasy mass about five feet thick, dates from the present to the new stone age some 7,000 years ago. In it we found circular mill stones, primitive tobacco pipes, pottery and other artifacts of the revolutionary period when men emerged from mere hunting and food gathering to agriculture and animal herding. The second layer, dating back 12,000 years to the middle stone age, as shown by radio-carbon measurements, contains the primitive artifacts of a people which knew neither agriculture nor pottery making. The third layer extends back to the old stone age, some 34,000 years. The layer is characterized by crude flint tools and goes down to about 16 feet. Below this we go down to bedrock at 45 feet, the layer dating back to 100,000 years. From time to time during that ancient period earthquakes dislodged huge chunks of rock from the ceiling and the falls occasionally killed and pinned representative Neanderthal occupants. One adult is estimated to have lived in the cave 45,000 years ago. A second was found at 23 feet below the surface and is believed to be about 65,000 years old. A child lay at a still lower level, perhaps 70,000 years old. Its skeleton was found doubled up, with the legs tucked under the chin and the arms folded close to the body. Most of the fragile skeleton was crushed, including the head and only the child's teeth and hand and foot bones are in good condition.

"For tens of thousands of years, we learn, Neanderthal man clung to this cave surviving the Ice Age, rockfalls and unremitting rains. Century after century his life continued with monotonous sameness; even his flint tools did not change. Then, finally, he was succeeded by the only human species now alive, Homo sapiens. The rudiments of civilization then began to emerge. Fortunately Shanidar Cave was discovered just in time. The Iraq Government plans to build a dam which will soon flood the Shanidar Valley and cut off access to this priceless repository of man's long history."

-- Scientific American

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DIGGERS ILLUMINATE ONE OF HISTORY'S DARK PAGES

Although eveything touched by Midas may not have turned to gold, Phrygia's renown King can scarcely be dismissed as legendary according to Machteld J. Mellink, chairman of the department of classical and near Eastern archaeology at Bryn Mawr College. "Midas," he states, "is no mere fairytale figure and the culture which thrived during his reign may well have provided an important link between preclassical Greece and the East."

Prior to 1950 historians of Western culture were puzzled by a gap extending from about 1200 to 800 B.C. which separated the Bronze and Iron Ages. But in that year archaeologists associated with the University Museum of the University of Pennsylvania undertook a series of excavations in a region of central Turkey which ancient records had pinpointed a likely hunting ground. The diggings have born interesting fruit. From all indications, the side of Midas' throne has been uncovered -- the capital of ancient Phrygia where Alexander sealed his destiny by cutting the Gordian knot.

"From the evidence turned up during these excavations," said Dr. Mellink, "we can now link the written reports of the Assyrians with those of the classical Greeks. Archaeologists working from the known to the unknown have peeled off layer after layer of history so that the story of Gordion is being played in reverse. The gap appears to be bridged from the

Cont. -

period when classical authors referred to Gordion as a once-famous site, back to the time of Herodotus' allusions to the royal throne sent as a votive offering by Midas to Delphi.

"Ancient Gordion is situated on a lofty plateau in the heart of Turkey, a land known to the ancients as Anatolia. The Phrygians appear to have been an Indo-European people fairly closely related to the Greeks in language and culture who entered Western Asia from the Balkans at the end of the second millenium B. C. They succeeded the Hittites as the dominant power of the region and, ultimately, attempted to expand their influence to the Aegean coast to the west and the Mesopotamian basin to the east. After dominating the area for a few centuries they fell before the Cimmerians, a people who corssed the Caucasus and whose name survives to this day in the word 'Crimea.'

"During the period of their dominance the Phrygians erected structures unrivaled by any found in Asia Minor. Those associated with the site we now believe to be Gordion are truly impressive. The city gate on the east, long hidden by many feet of overburden, stands to a height of more than 30 feet and is buttressed by mighty towers and gate chambers. Evidence indicates that the stone rampart once measured 40 feet in height and surrounded 20 acres of the citadel. The interiors of its enclosed structures feature floors of colored tile in intricate design and the burial chambers have provided us with artifacts in wood and bronze which may well command the respect of modern craftsmen. Some of these works clearly show the influence of eastern cultures. Others bear written inscriptions. Assuming that the Phrygians borrowed their alphabet from the Greeks, the Greek alphabet must already have had sufficient time to be developed from the Phoenician -- a discovery which may cause the historians of the Greek alphabet to re-examine their chronology.

"Work at the site is continuing and will doubtless further enrich the story of the arrival, development and expansion of the people who served as the ancient link between the cultures of East and West."

-- Scientific American

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ATOMIC FUELS COME IN COSTLY PACKAGES

One of the many factors which has thus far prevented atomic energy from competing with conventional sources of power is the difficult and costly problem of packaging nuclear fuel so it will "burn" effectively, according to James F. Schumar, director of mettalurgical engineering at the Argonne National Laboratory. Unless packaged in containers of exotic materials and intricate design the fuel warps, becomes poisoned and otherwise loses its effectiveness.

"Fueling the present family of nuclear power reactors," said Dr. Schumar this week, "is a far cry from stoking a coal furnace. Nuclear furnaces depend heavily on the design of the fuel elements. These are precisely engineered rods, plates of 'cans' containing the fuel in a protective coating of metal. The design of the elements is governed first of all by the requirements of nuclear physics. Assembled in a carefully computed lattice, the fuel elements must bring together the critical mass of fuel in which the fission reaction will begin spontaneously and sustain itself at the desired temperature with maximum utilization of the precious fuel (cost: $5,000 to $7,000 per pound). This same lattice must serve as a heat exchanger, protect the fuel from contamination, protect the personnel from radiation, withstand intense radiation itself (which tends to endow conventional materials with weird and unpredictable properties) and, finally, take account of the fact that the fuel will have to be reprocessed periodically to decontaminate it of fission products ('ashes') and recover the unburned residue. In sum, the design of a reactor and its fuel elements embodies the compromise of the competing claims of nuclear physics, thermodynamics, structural and materials engineering, nuclear chemistry, safety and economics. The compromise is often difficult to make. In consequence, at the present state of the art, there is no such thing as a 'standard' fuel element.

"As the million-degree temperatures of an uncontrolled chain reaction suggest, the problem is not so much how to generate the desired heat, but how to get it out of the reactor. A nuclear fuel element is an extremely compact heat source and generates many watts per ounce. The

element is of course hottest in the center and coolest at the surface To transfer this heat effectively, the metallic fuel is usually bonded to its container. The sharp temperature differences set up enormous stresses because of unequal expansion, aggravated by the necessity of circulating a coolant in the reactor. However elaborate, the cooling system develops inequality of pressure which worsens the problem. Next, many metals tend to expand when repeatedly heated and cooled, an effect remarkably apparent in uranium. In one experiment a bar of rolled uranium, heated and cooled 3,000 times, increased in length by six-fold! In addition, the fission products, or ashes, include two gases; krypton and xenon. Unable to enter into chemical combination with other elements, these accumulate inside the metal, building up pressures great enough to rupture the jacket and distort the shape of the fuel.

"One by one most of these problems have been met by compromise Metals, with physical properties almost unknown a few years ago, zirconium, vanadium, molybdenum and niobium. are today as familiar to machinists as conventional canning materials. It would seem that the economic mastery of the fuel problem is in sight. Now, however, the art of fuel-element design appears to have been made obsolete by the arrival of the so-called homogeneous reactor. In such a reactor the fuel and its moderator are intimately mixed. Such a reactor has been built. But even this development has not yet ushered in the millennium of low cost atomic power. The homogeneous reactor is accompanied by a whole new category of design problems quite as challenging as those of the fuel elements."

-- Scientific American

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NEW CONSTRUCTION MATERIAL

A new construction material comprised of high-strength steel encased by concrete has triggered something of a revolution in the construction industry within the past decade according to T. Y. Lin, professor of civil engineering at the University of California. "Lacing concrete with steel rods," he explained this week, "such that the steel is under tension and the concrete under compression, results in a combination stronger than concrete and cheaper than steel.

"Such 'prestressed concrete,' said Dr. Lin, "has been recognized within recent years as one of the great advances in construction of the 20th century. It provides builders with a material of superb strength, flexibility and economy. Already thousands of buildings and bridges have been constructed of it.

"The idea is simplicity itself. We take a long block of concrete, put a bar of steel through it lengthways and tighten nuts at the ends of the bar so that the steel is stretched and its tension compresses the concrete. Concrete, which is strong in compression, also loses its tendency to crack when thus compressed. Maximum advantage is taken simultaneously of the steel's high tensile strength. The stressed concrete span will now bear a considerable load. It is no longer brittle but actually resilient. Indeed, with prestressed concrete we can make a whippy fishpole or a bouncy diving board!

"Prestressed concrete should not be confused with reinforced concrete, which simply has steel embedded in it for support. The novel feature of the new combination is the built-in stress which stores energy in the concrete and the steel and thereby augments the strength of both. The combination has several obvious advantages. It saves steel, because the steel sinews are merely cables of slim rods. The concrete protects the steel from corrosion and fire. And pre-stressed concrete can easily be molded into any desired form -- a dome, a girder, an arch, a tank or whatever.

"It is apparent that the prestressing idea can be applied not only to concrete but also to ceramics and other materials. Indeed. prestressed ceramic wings for airplanes have already been tested. The prestressing steel gives the wing sufficient strength and the ceramic surface, which retains its strength at temperatures under which light metals soften, looks like a promising answer to the heat barrier. Among other materials to which prestressing has been successfully applied are bricks, timbers and even ordinary steel, which can be made to bear heavier loads by prestressing with embedded sinews of high-strength steel. But the ideal combination, from the standpoint of economy and flexibility, is high-strength steel and concrete.

To be continued

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1959-1960

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Society Objectives

To provide facilities for members of the Society to study geology, particularly the geology of the Oregon Country; the establishment and maintenance of a library and museum of geological works, maps, and specimens; the encouragement of geological study among amateurs; the support and promotion of geologic investigation in the Oregon Country; the designation, preservation, and interpretation of important geological features of the Oregon Country; the development of the mental capacities of its members in the study of geology; and the promotion of better acquaintance and closer association among those engaged in the above objectives.

Persons desiring to become members should contact the Secretary.

Regular annual dues (single or family memberships) are $5 for residents of Multnomah and adjacent counties; $2.50 for others; and $2 for Junior Members. Make remittances payable to the GEOLOGICAL SOCIETY OF THE OREGON COUNTRY.

Society Activities
(See "Calendar of the Month")

Evening Meetings: Formal lectures or informal round-table discussions on geological subjects, on the second and fourth Fridays of each month at Public Library Hall, S.W. 10th Avenue and Yamhill.

Field Trips: Usually one field trip is scheduled for each month.

Library Night: Once a month. Lewis and Clark College, Biology Bldg.

Luncheons: Informal luncheons, with geological motif, each Thursday noon in Room B, Chamber of Commerce Building, S.W. 5th Ave. and Taylor St. $1.00 per plate.

Publication: The Geological News Letter, issued once each month, is the official publication.

CALENDAR

Buffet luncheon every Thursday noon, second floor, Portland Chamber of Commerce, 824 S.W. 5th. One dollar.

Friday December 11 — Talk by Lloyd Ruff
Notes on the Geology of the Lower Columbia River. General discussion of geology of territory bordering Columbia River from Bonneville to the Sea. Illustrated by maps.

- JANUARY FIELD TRIP -

Be alert, says trip leader Franklin Brown, for a fine trip to the Coast in January. A study of the dunes at Cape Kiowanda near Tillamook will be our objective.

COLUMBIA RIVER FIELD TRIP

Busses number 5 and 17, filled with members of the society and friends and with Ralph Mason of the State Department of Geology and Mineral Industries and Paul Howell, our president, as leaders, departed from Portland State College about nine o'clock on the bright blue morning of October twenty fifth and headed for the Columbia River Gorge. Both buses were equipped with speaker systems so that it was possible to get a running account of points of interest as we passed them. Our attention was first called to the Portland Sands and Gravels and the terraces cut into them in the Vancouver and Portland areas; and then, as we swung onto the freeway, there was a discussion of Sullivan's Gulch and its origin as a late Pleistocene flood cut channel. We were now beginning to run into so much fog that it was difficult to see Rocky Butte as we passed and many were becoming apprehensive that we might be fogged in all morning.

Our first stop was in the entrenched canyon of the Sandy River near the Viking Park bridge. Here three different formations were pointed out to us; near road level was the micaceous sandstone of the Molalla formation, followed by the Troutdale formation making up most of the cliff above which was perched a layer of High Cascade fill. This is a new interpretation of this exposure, inasmuch as heretofore the lower portion has been considered a member of the Troutdale formation. We therefore had before us rocks of three different time levels of Miocene and Pliocene epochs, with a considerable hiatus in time between them and a span of probably several million years from oldest to youngest. Back in the busses we moved onward and upward until we were above the fog, observing the foreset beds of the Troutdale formation, here several hundred feet above their position at the first stop. The slope of these beds, seen just before reaching Vista House, suggests that they were deposited as a delta into a body of water and that here they have subsequently been raised as the Cascades were arched upward.

We were soon at our second stop, vista house. "What a view!" exclaimed everyone as we stepped from the busses. Before us lay the great fog river of the gorge, with the tip of Beacon rock protruding above its billowy surface in the distance. Were these the ghost waters of the great Missoula flood of 15,000 or so years ago or was this a new flood that had come to plague mankind? Although visibility was severely limited we were able to see on the Washington side of the river the late Pliocene to Pleistocene shield volcanoes of cascade andesite, Mt. Pleasant and Mt. Zion. Getting back in the busses we started down the sinuous road to the bottom of the gorge, noting that the fog was rapidly dissipating. Descending below the Troutdale formation we found ourselves at the top of the Columbia River basalts which here show pillow structure, evidence of extrusion in a small body of water. Creeping slowly onward and pausing here and there we were able to get views of Latourell Falls, Shepards Dell, and Bridal Veil and Wahkeena Falls before arriving at Multnomah falls. Here we spent about a half hour and many took advantage of this interval to hike to the bridge for a better view of the falls. Returning from this trip Mrs. Arthur Jones was chagrined to find that her husband had remained below and was conversing with a small group of people. "Arthur" she exclaimed, "why are you

wasting your time here when there is such a wonderful beauty behind you?" "Where", queried Dr. Jones, turning around and staring into the face of Mrs. Stephen Blore, who laughing remarked, "this is very flattering indeed".

Our next stop was at Oneonta Gorge where we viewed two thick flows of Columbia River basalt between which are the molds of a great many trees, proof that a considerable interval of time separated the flows. We were now approaching the axis of the Cascades and exposures of the Eagle Creek formation were visible in road cuts Our attention was drawn to the fact that the gorge here becomes wider because of the more rapid erosion of this formation In order to see the contact between the Columbia River basalt and the Eagle Creek formation we stopped at the McCord Creek bridge and hiked to Elowah Falls lookout, a place of great beauty and geological interest. This falls is around 290 feet high, the uppermost rock being Columbia River basalt under which lies over a hundred feet of Eagle Creek formation. A most interesting bit of geologic history may be deciphered from this contact. The Eagle Creek formation, of late Oligocene to early Miocene times, here consists largely of mudflows down the sides of the Eagle Creek volcano that centered on the Washington side of the Columbia and which was one of a line of volcanoes that was built along the youthful Cascade axis. Included in this formation are many fossil logs and stumps, some of which we noted on the east side of McCord Creek bridge. On the basis of ginkgo and other fossil leaves collected at the mouth of Moffet Creek Chaney correlated this with the John Day formation's Bridge Creek flora of Central Oregon and assigned it to the early Miocene. Some time after the erection of the Eagle Creek volcano the Columbia River lavas emerged from numerous fissures and buried most of it. Subsequent warping of the lavas into a series of anticlines and synclines, accompanied or followed by the cutting of the gorge by the Columbia River, has exposed this extremely interesting history. Elowah Falls, as well as the other falls close to the Columbia may be explained as having originated because that river was able to downcut much more rapidly than its tributaries, leaving the latter dropping from hanging valleys.

Lunch was eaten at Bonneville dam and afterwards brief stops were made to see the power plant and fish ladders Crossing the river at the dam we found ourselves on the great landslide area of Eagle Creek formation that temporarily dammed the Columbia and is believed to be the basis for the Indian legend of the "Bridge of the Gods". We were told that recent radiocarbon dating of wood buried in this landslide has placed this event as having occurred 735 plus or minus 25 years ago. The next stop was made at a sand and gravel pit just west of Wind mountain The bedding clearly shows that these were laid down by waters that swirled around the north side of the mountain. The size of this deposit is direct evidence of the magnitude of this great flood. We next examined wind mountain itself. This mountain and Shellrock mountain across the river are considered to be andesite porphyry intrusives through the Eagle Creek formation and into the Columbia River basalts. The possibility that these were prebasaltic intrusives was suggested by Paul Howell, since the evidence for post-basaltic origin does not appear too certain. After collecting rock samples we climbed back into the busses and proceeded on the homeward journey. There was general agreement that this was a most successful trip and that we must try more bus trips in the future. We are greatly indebted to Franklin Brown, our field trip chairman, for planning this trip and to Ralph Mason and Paul Howell for their excellent presentations of the geology.

Dr. James Stauffer

BUTTE CREEK FIELD TRIP
November 15, 1959

A small group of hardy Gesockers turned out for the last field trip of the season--in the Butte Creek area The November air was crisp but the sun shown through scattered clouds and gave welcome warmth to the adventurers. The object of the trip was to attempt to fix more clearly in our minds the relationships of the various strata exposed in the area. Principal trip leader was Murray Miller to whom were indebted for a fine and pleasureful excursion. Paul Howell assisted on the technical aspects. The group began to gather at Marquam about 9:00 a m. and at 9:15 started off up the Butte Creek road toward the first stop. Two more cars joined the group there.

The first stop was at a quarry located adjacent to the road in the SW 1/4 Sec. 24, T6S, R1E, W.M. The rock exposed there is a fine-grained, black basalt with brick-bat jointing. The consensus of the group was that it was similar to and might be an actual extension of the Columbia River Basalt found along the Clackamas and Molalla Rivers farther north. The similarity between this and an older basalt (Harper's pre-Butte Creek lava) was pointed out to the writer later in the trip. Distinctions were noted, but differentiation of the two is still not satisfactorily established and another trip for this purpose should be made next season.

The second stop was at a small roadside quarry adjacent to Butte Creek in Sec. 30 T6S, R2E, WM. The quarry exposes Illahe formation (equivalent to oligocene Eugene fm.) in contact with dark bluish-gray, fine-grained basalt. This is the older basalt previously mentioned. The Illahe is here a medium-grained, tan to buff-colored arkosic sandstone, highly fossiliferous in some layers. Slabs containing numerous casts and molds of both gastropods and pelecepods were obtained by members of the group. The basalt was previously thought to be intruded into the sediments, because of apparent contact alteration effects and upturning of the beds at the contact. However, nearby outcrops of basalt continuous with that in the quarry have definite flow aspects and the flexing of the beds therefore must be attributed to settlement and compaction effects around an old erosional knob of basalt. The basalt differs from the normal Columbia River Basalt in that the color of the fresh rock is bluish gray. It also contains small scattered phenocrysts of pyroxene and plagioclase, and it fractures with a rough uneven surface whereas the Columbia River Basalt fracture is characteristically subchonchoidal. The old basalt has a brick-bat jointing system in some outcrops and this makes for confusion with the Columbia River Basalt on cursory examination.

The third stop was at "The Slot" in Sec. 32, about a half mile above the junction of Coal Creek. At this locality Butte Creek cuts through a thick sill-dike of medium-grained dark gray diabase. For a hundred feet or more the creek flows in a narrow slot, in places less than ten feet across. At the head of the slot is a narrow cataract. Down stream from "The Slot", the diabase cuts abruptly up across the Illahe sandstone which is nicely exposed in a high road cut. The exact contact is obscured by overburden, but "dorniks" of spheroidally weathered diabase indicate the general position. The Illahe is here medium gray and contains concretionary bands, identifying it as the middle member.

From this point the group turned back to Scotts Mills and took the Maple Grove road up over the hill toward Wilhoit. A short stop was made at Beaver Creek to try and check the basalt there, but most of it was "float" and no positive outcrops were found. Two, and possibly three, types were noted and the material probably represents more than one body and possibly more than one age.

The final stop was made at an old rock quarry adjacent to the abandoned logging railroad near the south edge of Sec. 27, T5S, R2E, W.M. The rock there is a platy, porphyritic andesite, containing large phenocrysts of plagioclase and of pyroxene. Similar rock extends southward to beyond the head of Butte Creek. It has been postulated by both Barlow and Halstead (Masters theses on the central and northern thirds of the Lyons Quadrangle, respectively.) that this rock is the Cascan of Hodge and that it overlies the Fern Ridge Tuff. However, Murray Miller and Paul Howell had previously noted similar platy andesite underlying Columbia River Basalt on the Molalla River (Ostrander) road 3 miles above Weyerhauser's Gate. Baldwin and others have inferred that the porphyritic andesite is older than the Molalla formation which is in part, at least, equivalent to the Fern Ridge Tuff. It may be that there are two fairly similar porphyritic andesites of quite different ages in this area. It is readily apparent that further investigation is in order.

Of particular interest at the final stop was a large earth fissure extending down into the rock to great depths. Geologic relationships indicate this is probably part of a large fault trending in a general east-west direction. Part of the fissure was recently explored by speleologists.

P. W. H.

- BROWSINGS -

The deepest lake is in Siberia. Lake Baikal is 4900 Ft. deep, no doubt Miocene. It extends 3400 feet below sea level.

NEW CONSTRUCTION MATERIAL -(continued from Nov. bulletin)

"The flexible possibilities of prestressed concrete buildings are beautifully illustrated by a couple of examples. At Caracas, Venezuela, the new National Race Course has a grandstand roof of prestressed concrete only three inches thick which projects 90 feet from its supporting pillars so that no posts obstruct the view. At present the edge of the roof is tipped upward about an inch by the pull of the steel wires. This will eventually flatten out. But it will never droop as conventional cantilevered roofs commonly do. The other example is a factory in Los Angeles whose roof, a three-inch slab of prestressed concrete covering 100,000 square feet, is filled with two inches of water to cool the building. The entire roof is watertight without waterproofing! It has carried water a year now without leakage.

"The new material is being put to work around the world for foundations, dams, roads, airfield runways, railway ties and even telephone poles which are expected to last forever. The possible applications indeed seem almost limitless."

Based on the article, "Prestressed Concrete"
July 1958 issue - Scientific American

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100,000 MILES OF GLACIAL DEBRIS - -

- - Stone Walls, Farewell

The stone walls of New England--as much a part of the Yankee heritage as Lexington and Concord--are going the way of many other things from our rural past.

The Federal Soil Conservation Service of the Department of Agriculture reports that, with current farming methods demanding unimpeded acreage for strip-cropping, diversion terraces and other conservation practices, as well as the efficient use of mechanized equipment to boost production, the barricades that for so long have been a part of the New England landscape are being torn down at an accelerated rate. The work of removal began seriously in 1944 after a bulletin by the service noted: "Stone walls, monuments to the agriculture of the period of which the scythe and the ox team were the symbols, and all right for that period, are the stumbling blocks of agriculture."

There were once no less than 100,000 miles of these "stumbling blocks." Massachusetts alone had 8,500 miles in 1944. The little New Hampshire town of Sutton, with a population of about 570, boasts 500 miles of them.

It is estimated that so far about 10 per cent of the original walls have been torn down, at a cost of about $200 a thousand feet. The stones are disposed of in various ways; some are dumped into ravines or wood lots, others go into foundations or fills. The idea is to put them in any convenient place off usable land.

Why were these walls, which represent countless hours of backbreaking labor by past generations of farmers, built in the first place?

The answer goes back to the last Ice Age when the melting ice cap dumped its load of boulders on what is now New England. The result was primeval patches of glacial debris, ranging from fist-sized stones to great "rockbergs" with most of their bulk underground. The stone wall was the logical answer to the problem of cleaning up the inhospitable land so that crops could be grown. At the same time, of course, it marked the farmer's boundaries, fenced his livestock in and helped keep predators out.

The great era of stone-wall building was between 1700 and 1875. Innumerable farmers worked themselves into early graves in their endless bout with boulders. And even after the surface rocks were subdued, others had a way of rearing up out of the ground with the spring thaws, encouraging folk tales about rocks that "grew."

Still standing after many years are numerous walls of special interest. The tiny Massachusetts town of Hardwick has a wall built before the Revolution by Brig. Gen. Timothy Ruggles, a stout-hearted Indian fighter, farmer, lawyer and judge. It is, as New Englanders say, "pig-tight, bull-strong, horse-high"--and wide enough to turn an ox team and cart around on its top.

A similar wall stands in the near-by town of Charlton, built around 1840 for Dr. Charles M. Fay, a physician, by patients who owed him money. It is sixteen feet thick, ten feet high and 650 feet long.

Stone Walls - cont.

The whaling port of New Bedford has fewer walls than other places because it relinquished 7,500 tons of its native stone at fifty cents a ton to help win the Civil War.

In late 1861 armed Confederate ships, slipping out of Southern ports, were raising havoc with Federal commerce, the whaling fleet included. A secret plan was hatched in Washington and forty-five idle whalers were stripped for a one-way trip. They were loaded with local stone and sunk in Southern harbors to help the North's blockading fleet.

Of the esthetic side of stone walls, Henry Ward Beecher noted: "There are only two or three things required for a good stone wall. It must be made so that chipmunks can run in and out easily; it must have woodbine enough in spots; it must have a deal of moss growing on it; and it must be broad enough on the top to walk on."

More down to bedrock is the comment of a farmer in Worcester County, Mass.

"My grandfather," he said "spent his lifetime building stone walls, and he acquired a real picturesque vocabulary doing it. I'm spending all my life tearing down his walls--and cussing at the same stones."

Ivan Sandrof,
The New York Times

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BOOK NOTICES
By Franklin L. Davis

This Sculptured Earth: The Landscape of America, by John A Shimer, Ph. D., Assistant Professor of Geology at Brooklyn College. Published by Columbia University Press, 1959. Cloth, 255 pages. Portland Library Call No. 557.3 S55t. The Library has two copies.

The book is tailored for popular scientific reading and contains many beautiful illustrations and line drawings. It is a book which should have a particular appeal for anyone who has enough interest in Geology to become a member of G. S. O. C. Included in the illustrations is a double page map of the Geological Provinces of U. S. There is also a geological time chart. The sea shore of Oregon and the outstanding geological features of the Northwest are given extended treatment.

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- - - OIL WELLS PLUNGE TO RECORD DEPTHS

As the growing demand for petroleum depletes pools of oil at shallow depths, drillers are developing techniques for tapping reserves at lower levels. One dry hole in Texas, already at the record depth of five miles, is being pushed still deeper, it was announced this week by Sullivan S. Marsden, Jr., associate professor of petroleum engineering at Stanford University.

"To discover new reserves of petroleum at the same rate as 20 years ago," said Dr. Marsden, "prospectors are drilling seven times as many wells and, on the average, are drilling them nearly half again as deep. Yet, for all this extra effort they have not increased the rate at which oil is being discovered. The cost of prospecting thus becomes an ever larger element in the cost of oil.

"The ingenuity of drillers, however, has kept the direct costs of drilling constant, though the cost of every element in the operation has risen with inflation. What is more, drilling technology has now entered a phase of innovation that promises to reduce costs and to drive wells faster and deeper than ever before. Some of the most significant innovations coming into use are products of Soviet technology. They involve the simple but radical stratagem of moving the engine that drives the drill from the surface of the ground to the bottom of the hole along with the drill itself. This Russian 'revolution' in drilling will open to exploitation oil-bearing sands at depths now attainable only at prohibitive cost.

"The rotary drill, conventional tool of U. S. drillers, first came into use in 1901. It resembles in principle the familiar drills used for cutting holes through wood or metal. The bit is mounted at the end of a long steel pipe rotated by a power-driven turntable at the surface. The rotary action causes the bit to cut by abrading and chipping the rock. The debris

is flushed out of the hole by a stream of thin mud forced down the drill pipe by a high-pressure pump at the surface. As the well goes deeper, however, more and more energy is lost by friction between the rotating pipe and the wall. Ultimately this frictional loss attains a value beyond which further drilling is impractical.

"The declining efficiency shows up clearly in drilling costs. For a 4,000 foot well the direct drilling cost in 1957 was about $4.50 per foot. In the deeper sections of a 20,000 foot well the costs increase to more than $100.00 per foot.

"It is clear that the way to bring oil sands at such depths within practical and economical drilling range is to place the power source that drives the drill at the bottom of the hole. In the U.S.S.R., four such arrangements are now in use. In one development, thin mud is forced down a stationary string of pipe to power a slender turbine at the bottom which rotates a bit coupled to the lower end of the turbine's drive shaft. In another, called the 'pellet' drill, a high-velocity jet of mud directed by a special nozzle blasts steel pellets against the bottom of the hole. The mud returns to the surface around the outside of the pipe, as in conventional rotary drilling, but the pellets which do the cutting recirculate in the nozzle. A third development substitutes electric power for flowing mud. A motor, fed by cables from the surface, drives the bit through reduction gearing and circulates just enough mud at the bottom of the hole to transfer the cuttings to a bucket associated with the bit. The 'electrodrill' is hauled to the surface periodically and cleaned of the accumulated debris. The most radical departure from conventional techniques is the so-called 'flame drill,' a rocket-like jet, now in the experimental stage, which vaporizes rock at the bottom of the hole in a 3,500 degree flame produced by burning a mixture of oxygen and kerosene. Recent Soviet publications have claimed that with such equipment their engineers can drill a hole ten miles deep!

"A panel of U.S. experts recently discussed whether, using rotary equipment, we could do the same and concluded that we could. Even if a 50,000 foot hole struck oil it could not pay for itself. It would, however, supply a good deal of valuable information on temperatures, radioactivity and rock structures at extreme depths. The scientific value of such a hole might justify government sponsorship."

Based on the article "Drilling for Petroleum"
November 1958 issue, Scientific American.

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EARTH's MAGNETISM -

Why is the earth a magnet? The best answer so far to this multi-century old puzzle came this week from Walter M. Elsasser, professor of physics at the LaJolla campus at the University of California. The slow flow of molten iron and nickel which largely comprise the earth's fluid core appears to generate electric currents, Dr. Elsasser explained, and these in turn doubtless set up the magnetic field.

"The problem of explaining the precise origin of the earth's magnetism may be with us for a long time to come," said Dr. Elsasser, "because the main source of the magnetic field undoubtedly lies deep in the interior of the earth, forever beyond reach of our direct investigation. But as we learn more about physics, and about the properties of our planet, we are coming closer and closer to a reasonable theory which rests on established physical principles and fits the known facts.

"Some 350 years ago William Gilbert, the Elizabethan scientific genius, thought that the field might be produced by a large body of permanently magnetic material inside the earth. This idea had to be given up a long time ago when it became plain that the temperature of the earth's interior must be too high to allow any material to retain magnetism. Physicists were left completely at a loss to explain the field. Then, for a time, it became fashionable to look for some new cosmic process for producing magnetism -- one which eluded detection in the laboratory but applied to very large rotating bodies such as planets and the earth. Recently this idea has had to be abandoned because astrophysical evidence shows very clearly that the magnetism of stars does not conform to any reasonable scheme involving a new fundamental law.

"Perhaps we have been looking too far from home for the answer. It is just possible that the action we seek on the global scale lies before our eyes in the simple and familiar process we use to generate magnetic fields every day -- namely the flow of current in the dynamo.

The dynamo converts the energy of mechanical motion into electric current and the current, in turn, induces magnetism. The motion may be relative motion between a coil and a ferromagnetic material or between two coils (or other conductors of electricity).

"Here, then, we have a plausible mechanism. Let us now look at the earth's interior to see whether currents can actually be generated there. The study of earthquake waves has told us that the earth has a hot fluid core some 4,316 miles in diameter. The core may be, and probably is, in motion -- for the same reason that convection currents appear when a pot of water is heated at the bottom. Finally, we are reasonably sure the main material of the core is iron with nickel plus some dissolved impurities. Thus we have at once a good conductor of electricity and a fluid in which motions can easily take place. In other words, the core is precisely the kind of mechanism our theory requires.

"The question arises at once: What is the source of energy for these motions? We do not as yet have a conclusive answer. One thing we know, calculations show that the energy required to maintain motion in the earth's core is surprisingly small. Some scientists believe that heat flowing from the center of the earth gives rise to it.

"One major question remains: Why does the earth have a unified general field? The convection currents in the fluid core should break up into relatively small swirls and produce only localized eddies, not a general field. We have a reasonable answer to the question. The stage director that lines up the eddies in some sort of order must be the earth's rotation, for the general field is aligned approximately along the axis of rotation. Such an action would produce an over-all field which would be fairly stable, but, since eddies start, grow and decay in more or less random fashion, a magnetic field generated by them would tend to vary slightly and would be unpredictable in its details. This is precisely the effect we observe."

Based on the article "The Earth as a Dynamo"
May 1958 issue, Scientific American.

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TWISTERS

Scientists of the U. S. Weather Bureau are closing in on one of man's great natural enemies: the tornado or "twister." Last year, according to Morris Tepper, head of the Weather Bureau's Severe Local Storm Research Unit, the 924 tornadoes reported in the U. S. killed 191 people, injured 2,343 and caused damage amounting to more than $73 millions.

"Just how a tornado develops its prodigious energy," said Dr. Tepper this week, "is still a complete mystery. But the general picture of these storms is familiar enough. They are generally brewed on a hot, sticky day with south winds and an ominous sky. From the base of a thunderhead a funnel-shaped cloud extends a violently twisting spout toward the earth. As it sucks up matter in its path, the twister may turn black, brown or occasionally even white (over snow). The tornado approaches with the roar of hundreds of jet planes. Its lifetime is as brief as the storm is violent. The speed of its winds is estimated at up to 500 miles per hour. Within a few tens of miles (average: about 16) it spends its force and suddenly disappears.

"Although our knowledge on the precise mechanism of the storm is incomplete, we now know enough about the general conditions associated with it to set up a forecast center in Kansas City for issuing alerts when conditions seem to indicate that tornadoes may develop. The favorite locale and time of tornadoes is the Midwest in the late spring and early summer. Twisters come most often in the late afternoon or early evening -- between 3 and 9 p. m. As noted, the setting is usually a hot, muggy day with southerly winds. More specifically, four conditions seem to be indispensable. First, there must be moist, warm air at low levels. Second, a strong southerly wind is required at the surface plus a strong wind aloft blowing from a different direction, usually westerly or southwesterly. Finally, some lifting mechanism must exist, such as a cold front or storm line, which drives the warm air upward. Most commonly this last mechanism -- what might be called the trigger that starts

a tornado -- is a line of thunderstorms, known as a 'squall line.'

"During the past six years the Weather Bureau has been operating a close network of stations in the tornado belt to get a fine-scale picture of atmospheric conditions. The stations, only 25 to 30 miles apart, record pressure, temperature, humidity, rain and wind. This detailed survey has brought to light that tornadoes frequently develop in a small squall line or a line of sharp rise in pressure. The 'pressure jump' is so ominous as possible harbinger of tornadoes that the Weather Bureau has installed an alarm device in about 100 stations which sounds a buzzer and flashes a light when the pressure jumps. These stations are monitored 24 hours a day because the storms can appear at any hour, or season. For that matter, they also occur in every part of the country, although rarely in or west of the Rocky Mountains.

"At present, our forecasts cover areas of half a state or more and predict the likelihood of a tornado occurring somewhere within the area. Any effective warning system must, of course, not only discover the conditions that threaten to generate such a storm but pinpoint the area where it is likely to strike. To achieve sharper forecasts we shall need much more research on the general setting in which tornadoes are apt to materialize, on the basic principles that underlie their development and on the localized structures from which they are born. In addition, it is necessary to have a system of rapid detection and warning so people may be alerted in the path. A number of networks, manned by public-spirited volunteers, have already been organized in the metropolitan areas to report threatening conditions to the Weather Bureau, as well as the development of active storms."

Based on the article "Tornadoes"
May 1958 issue, Scientific American.

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BROWSINGS --

The first tunnel was built under the Euphrates River 2000 B. C. It was a record in excavation which stood for some 4000 years.

Science Digest, December 1959.

- NO NEED TO SKATE ON THIN ICE -

Near the South Pole it is 14000 feet thick!

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The deepest well is in Texas - 25340 feet.

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Egypt, perhaps the Cradle of Civilization, will have its first germ-free drinking water. Five hundred new wells will tap the resources of an underground Nile during the next three years.

New York Times -
Nov. 11, 1959

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