

CROSBY REPORT TELLS HISTORY OF EARLY AGES

(Continued from page 6.)

river channel and the reservoir area. It is plain, therefore, that, in view of the probable leakage of the tunnel roof, and its possible local collapse, a heavy responsibility rests upon this carpet of silt.

Also in view of the fact that the discovery of the tunnel is due to a mere accident, a chance fall of the roof, it is a natural thought that there may be others, for beyond the limits of the collapsed portion we look in vain for any surface indication of the tunnel. Almost our only clue is afforded by the thought that the tunnels tend to follow the depressions or valleys of the original or pre-lava surface; and here we encounter the difficulty that the pre-lava depressions are likely to be traced by the flow. In fact this appears to be the case with the tunnel under discussion. It is not now conspicuously marked by a surface depression. It does appear reasonable, however, that the lava tunnels will not be closely spaced, in other words, that the occurrence of a tunnel immunizes a considerable breadth of lava on either side.

Besides the unnamed tunnel already described, I have knowledge, derived from the Deschutes National Forest map, of only two tunnels on the eastern slope of the Deschutes valley. These are the Arnold Ice Cave, a dozen miles southeast of Bend and trending in that direction, and Horse Cave, about three miles east of Bend, but sharing, also the northwesterly trend. Horse Cave is irregularly branching; and there are indications that the Arnold Ice Cave may also be branched. But whether the branches are tributaries or distributaries (converging or diverging) is not very clear. The Arnold Ice Cave also belongs, as the name implies, to the class in which the drifted snow of winter exceeds the summer melting. Such examples might be called natural ice houses. Although we can not suppose that the ice extends far from the opening it may accumulate to such an extent as to make exploration difficult or impossible. The Edison Ice Cave, some 17 miles in a direct line southwest of Bend, and eight miles west of the reservoir, is a case in point. It is at an elevation of about 6,000 feet.

The western or cascade slope of the Deschutes valley appears, by virtue of its relatively steep slope, to be especially favorable to lava

tunnel development; but the old, weathered and more or less rotten condition of the basalt is unfavorable to tunnel preservation. Thus the Edison Ice Cave is entered by an artificial shaft sunk in highly oxidized and decomposed basalt. And the giant springs so characteristic of this well watered western slope escape, it is believed, from collapsed tunnels in weathered and rotten basalt. This is, probably, the best explanation of the outflows of water to which we owe Fall river, Spring river and Metolius river, and, possibly, some of the dozen or more other springs named or indicated on the map. Of fairly frequent occurrence, also, are longitudinal depressions of the surface suggestive of the collapse of lava tunnels. Assuming that Spring river and Fall river do represent collapsed tunnels, the question arises as to whether or not the tunnels are choked beyond the vents of the springs. Although definite data on which to base an answer are lacking, more or less complete clogging of the tunnels appears most probable. But however this may be, we can not doubt that the tunnels, either closed or open, do extend obliquely downward beneath the reservoir area to the axis of the valley, where, possibly, they are united. Since they are referable to one and the same great outflow of basalt, and are, thus, essentially contemporaneous, their union, originally if not now, appears to be a safe conclusion. Recognizing the western as far older, many thousands of years older, than the eastern basalt of the Deschutes valley, the assumption is not warranted that the western tunnels are or ever were confluent with the eastern and relatively modern tunnel. We must assume, rather, that after the western basalt had swept well across the valley crowding the river before it and isolating the Benham Falls rhyolite ridge, which thus became a steppe, the eastern flow of basalt overlapped the western and crowded the river back toward its original location; but with both river channel and tunnel at a higher elevation. Another consideration unfavorable to the coincidence of the eastern and western tunnels is that while the normal trend is northwesterly for the former it is northeasterly for the latter. The two systems thus tend to cross at large angles, as well as at different levels, and coincidence is hopeless. But they clearly agree in this: They all underlie the floor of the proposed Benham Falls reservoir.

Recent Volcanic Phenomena
The term recent is here used in a geologic, and not in a human, sense. Any geologic, and especially

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any volcanic, happening within the last 5,000 years, may fairly be described as recent, and within the last 1,000 years as very recent. Although the contrary impression very generally prevails, it is doubtful if any noteworthy geologic occurrence of an igneous or volcanic nature has come to pass in the last 1000 years in the Cascade region of Central Oregon; and we can not be sure of any such happening within the last 5,000 years. Anyhow, we will now extend the term geologically recent to cover the formation of all the uneroded cones and flows of the upper Deschutes valley; and make the classification easy by regarding the great basalt plateau—including the relatively old flow of the west slope and the relatively new flow of the east slope—as geologically ancient (Miocene and Pliocene), and the cones dotting the surface of the plateau and the flows making a patchwork of its surface as geologically modern (Quaternary and Recent).

Many Cones Found.
Within 40 miles south of Bend no fewer than 150 cones have been mapped ranging in elevation, approximately, from 300 to 3000 feet above the surface of the plateau. It is, of course, probable that some of these cones are rhyolite steeples and hence older than the surrounding basalt plateau, but a large majority, surely, are of basaltic composition—either cinder cones or aggregates of cinders, dust and lapilli, and newer than the plateau on which they stand. The flows, representing the more pasty and fluid part of the ejected material, appear to have been much less completely mapped than the cones, and are shown, in many or a majority of instances, without associated cones. Adding the headless flows to the list of cones would increase the number of vents at least to 160. On the western slope the vents are distributed somewhat uniformly, averaging one to every ten square miles, while on the eastern slope there are very few vents north of the Newberry crater, and they are thickly grouped over a wide zone south and southeast of the crater, the two slopes thus averaging nearly equal area for area.

It seems impossible, on either slope, to discover any sort of regularity or order in the distribution of the vents. It might be supposed that from the great fissure of the Cascade crest springs a series of parallel oblique fissures on which the vents are located. That is, no doubt, the principle or keynote of the distribution, but minus the main part of the regularity. One very striking feature of the distribution of the vents is their fewness in the vicinity of the river, especially if we keep to the main line of the river, which is the East Deschutes, or so-called Little river. The West Deschutes is called, also, the Big river, simply because it drains the humid Cascade slope and, hence excels in volume of water, though not in length, breadth or depth of valley. Following, then, this more direct and ample drainage line, we find not one basaltic vent within two miles of the river and, within 50 miles south of Bend, only five vents within four miles of the river, these five including Pilot butte and Lava butte, the latter in the latitude of Benham falls. Within 40 miles south of Benham falls, vents, although within two to four miles on the west, are much more distant on the east, especially south of Bates butte, where the area practically free from vents expands rapidly from a breadth of six miles to 25 miles. What part, if any, the river may have played in the determination of this broad expanse free from volcanic vents we can only conjecture. But it is certainly an interesting and significant fact that the proposed reservoir lies wholly within this area. Assuming, as we must, that every volcanic vent is located on a profound fracture traversing

the entire thickness of the great Columbia basalt and many thousands of feet in thickness of the subjacent formations, we may well feel grateful that the broad synclinal axial zone between the eastward-dipping older basalt on the west and the westward-dipping newer basalt on the east does not appear to be broken by either the eastern or the western fissures.

Fissures Not Lines of Weakness.
Another way of regarding the matter is to suppose that the fissures of the western basalt do not extend as far east as the river, nor those of the eastern basalt as far west as the river. The western slope presents a continuous, wide zone of vents and, we must suppose, correlating fissures, but all the vents and related fissures of the eastern slope must, apparently, be correlated with the gigantic Newberry crater, the "sphere of influence" of which extends outward for 10 to 15 miles in all directions.

Taking it for granted that the vents have their origin in profound fissures does not, however, mean that these fissures must still be regarded as lines of weakness, nor, necessarily, as a menace to the tightness of the reservoir should they traverse its floor, for we are warranted in supposing that fissures sufficiently profound to develop volcanic vents would be filled with the molten lava and converted, by slow cooling, into water-tight dikes. Of course the case would be radically different if dynamic cracking and rifting should follow the formation of the dikes and the freezing of the lava in the ground.

Lava Butte Cone and Flow.
The relations of this most recent of all the volcanic eruptions of the region to the proposed Benham falls dam and reservoir are so close and vital as to demand its separate description and discussion. From the western base of a normal cone of cinders and lapilli about 500 feet high, with a summit crater about 150 feet deep, there has flowed away a volume of liquid and pasty lava sufficient to cover an area of at least 10 square miles to a depth of 50 to 100 or more feet. The course of the lava flow was first northwesterly about two miles, with a breadth of one mile, to and across the Deschutes river, and then northerly, down the valley for four miles, with a breadth of two to three miles. The surface and steep margins of this flood of lava are indescribably rough and traveling across it is necessarily slow and painful.

The eruption appears to have been accompanied by but little wind, since the surface of the flow is practically free from dust and hence, also from vegetation, with the exception of an occasional pine tree—one to several to a square mile. The dusty slopes of the cone are, naturally, more hospitable to vegetation than the bare surface of the flow, and the northeasterly aspect supports a scattering growth of pines.

The lava is throughout so black, hard and shining, so fresh and so free from visible weathering or alteration of any kind that the first im-

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pression is one of great recency of eruption, and few are disposed to estimate the age of the eruption at more than a century or two, and many would place the time of the extrusion of the lava at less than a century in the past, but for the fact that we have no human record and the testimony of man is wholly wanting.

River Tells Country's Age.
Perhaps the most cogent argument for the considerable antiquity of Lava butte and its lava is afforded by the fact that the lava, having crowded the river out of its bed and over the rhyolite ridge, the river has since cut a gorge approximately 50 deep in the massive rhyolite. Assuming 20 feet of weathered and more or less decayed and easily eroded rhyolite, we must recognize that cutting a notch 50 feet deep in the solid, unweathered rhyolite was a large task for a river of clear water entirely unarmed by sand or gravel or other cutting material. Of this condition we are assured by the fact that the river is deep and its current sluggish for a considerable distance above the falls. Beyond a doubt, the time since the lava turned the river over the rhyolite ridge and brought Benham falls into existence must be reckoned in thousands of years, and 5000 years does not appear an extreme or unreasonable estimate.

(To Be Continued.)

LEGAL NOTICES

INDEPENDENT CANDIDATE FOR COUNTY JUDGE
Tumalo, Ore., Aug. 16, 1920.
At the solicitation of a large number of farmers of Deschutes county, I announce myself as an independent candidate for the position of county judge. Watch for my "platform."
CHAS. HOPSTETTER.

NOTICE FOR PUBLICATION (Not Coal Land)
Department of the Interior, U. S. Land Office at Lakeview, Oregon, August 11, 1920.
Notice is hereby given that R. Harold Landfare of Lapine, Oregon, who, on July 11, 1917, made Homestead Entry No. 010423 for lots 5-6, NE 1/4, SW 1/4, SE 1/4, NW 1/4, Section 6, Township 21 S., Range 10 E., Willamette Meridian, has filed notice of intention to make final three-year proof, to establish claim to the land above described, before E. L. Clark, U. S. Commissioner, at Lapine, Oregon, on the 25th day of September, 1920.
Claimant names as witnesses: Chris C. Somers, Henry Whited, C. W. Case, all of Lapine, Oregon; Frank Foster of Powell Butte, Oregon.
JAS. H. BURGESS, Register.

In the County Court of the State of Oregon, for the County of Deschutes.
In the matter of the estate of F. M. Wright, deceased.
To E. M. Wilson, Edgar Wright, Homer Wright, Etta Gustavis, Carrie Bettis, Nellie Nugent, Minnie Bradley, Lida Doud Young, Esther Doud, Leland Doud, Flora Stewart, Clara Wright, Arthur H. Moe, Rev. Verne Thompson, the known heirs at law of F. M. Wright, deceased, and to all the unknown heirs of said decedent, greeting.
You are hereby cited and required to appear in the County Court of the State of Oregon, for the County of Deschutes, at the court room thereof, in the city of Bend, in said county, on Monday, the 20th day of September, 1920, at 2 o'clock in the afternoon of said day, then and there to show cause why an order should not be granted to the administrator of said estate to sell so much of the hereinafter described real estate of said decedent as shall be necessary to pay the debts outstanding and the expenses of administration, to-wit: The NW 1/4 of the SW 1/4 of Section 35, in Township 17 South, Range 12 East of the Willamette Meridian, in Deschutes County, Oregon, together with a 24-acre water right appurtenant thereto.
Witness, the Hon. Robert W. Sawyer, Judge of the County Court of the State of Oregon, for the County of Deschutes, with the seal of said court affixed this 12th day of August, 1920.
Attest: J. H. HANER, County Clerk.

In the County Court of the State of Oregon, for the County of Deschutes.
In the matter of the estate of F. M. Wright, deceased.
To E. M. Wilson, Edgar Wright, Homer Wright, Etta Gustavis, Carrie Bettis, Nellie Nugent, Minnie Bradley, Lida Doud Young, Esther Doud, Leland Doud, Flora Stewart, Clara Wright, Arthur H. Moe, Rev. Verne Thompson, the known heirs at law of F. M. Wright, deceased, and to all the unknown heirs of said decedent, greeting.
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Attest: J. H. HANER, County Clerk.

NOTICE FOR PUBLICATION (Not Coal Land)
Department of the Interior, U. S. Land Office at Lakeview, Oregon, July 12, 1920.
Notice is hereby given that Cora Leland of Lapine, Oregon, who, on July 26, 1917, made Homestead Entry No. 010383, for SW 1/4 NW 1/4, NW 1/4 SW 1/4, E 1/2 SW 1/4, Section 2, Township 23, South Range 9 East, Willamette Meridian, has filed notice of intention to make final three-year proof, to establish claim to the land above described, before E. L. Clark, U. S. Commissioner, at La Pine, Oregon, on the 21st day of August, 1920.
Claimant names as witnesses: Kate Zieralf, R. E. Eaton, B. C. Scott, Maude Eaton, all of Lapine, Oregon.
JAS. F. BURGESS, Register.

NOTICE FOR PUBLICATION (Not Coal Land)
Department of the Interior, U. S. Land Office at Lakeview, Oregon, July 12, 1920.
Notice is hereby given that Herman A. Rose, of Lapine, Oregon, who, on April 28, 1916, made Homestead Entry No. 09227, for W 1/2 NE 1/4, Section 15; W 1/2 SE 1/4, Section 10, Township 23 South, Range 9 East, Willamette Meridian, has filed notice of intention to make final three-year proof, to establish claim to the land above described, before E. L. Clark, U. S. Commissioner, at La Pine, Oregon, on the 20th day of August, 1920.
Claimant names as witnesses: R. E. Eaton, Fred Mahn, H. A. Rose, W. G. Fordham, all of Lapine, Oregon.
JAS. F. BURGESS, Register.

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NOTICE OF PUBLICATION
U. S. Land Office at The Dalles, Oregon, August 5, 1920.
Notice is hereby given that William A. Golden of Bend, Oregon, who, on June 29, 1917, made homestead entry No. 016737, and on Jan. 16, 1920, made additional homestead entry No. 018063, for NE 1/4 SW 1/4, N 1/2 SE 1/4, SE 1/4 SE 1/4, Sec. 20; S 1/2 SW 1/4, Sec. 21; NW 1/4, N 1/2 SW 1/4, Section 28, and NE 1/4, Section 29, Township 19 South, Range 14 East, Willamette Meridian, has filed notice of intention to make three-year proof, to establish claim to the land above described, before H. C. Ellis, United States Land Commissioner, Bend, Oregon, on the 5th day of October, 1920.
Claimant names as witnesses: Howard F. Dyer of Millican, Oregon; Denzil C. Dyer, of Bend, Oregon; R. A. Kilpatrick, of Bend, Oregon; Archie Pepin, of Millican, Oregon.
H. FRANK WOODCOCK, Register.

NOTICE OF HEARING
In the County Court of the State of Oregon for the County of Deschutes.
In the matter of the estate of Ole O. Dragsvold, deceased.
Notice is hereby given that on Tuesday, the 14th day of Sept., 1920, at the County Court Room, in the city of Bend, Deschutes County, Oregon, at the hour of 2 p. m. of said day, the following matter will be heard and considered, to-wit:
The petition of Julius Pedersen for the probate of those certain instruments in writing purporting to constitute the last will and testament of said Ole O. Dragsvold, deceased, for the granting of letters testamentary therefor to said petitioner and for the taking of any testimony therein that may have a bearing upon said alleged last will and testament and the disposal of the estate of said deceased in accordance with his wishes.
Dated at Bend, Oregon, August 7, 1920.
ROBERT W. SAWYER, County Judge.

NOTICE OF HEARING ON FINAL ACCOUNT
In the County Court of the State of Oregon, for Deschutes County.
In the matter of the estate of Ole Olson, deceased.
Notice is hereby given that Theodore Aune, administrator of the estate of Ole Olson, deceased, has made and filed with the Clerk of the County clerk of Deschutes County, Oregon, his final account of his administration of said estate, and that the Judge of the above entitled Court has set the 3rd day of September, 1920, at the hour of 2 o'clock in the afternoon of said day, at the court room in Bend, Deschutes County, Oregon, as the time and place of hearing said final account and of the settling of said estate, and all persons interested are cited to appear at said time and place and show cause, if any, why said account should not be allowed, and said estate closed and settled.
Dated this 5th day of August, 1920.
THEODORE AUNE, Administrator of the estate of Ole Olson, deceased.
DE ARMOND & ERSKINE, Attorneys for Administrator.

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Department of the Interior, U. S. Land Office at Lakeview, Oregon, July 12, 1920.
Notice is hereby given that Cora Leland of Lapine, Oregon, who, on July 26, 1917, made Homestead Entry No. 010383, for SW 1/4 NW 1/4, NW 1/4 SW 1/4, E 1/2 SW 1/4, Section 2, Township 23, South Range 9 East, Willamette Meridian, has filed notice of intention to make final three-year proof, to establish claim to the land above described, before E. L. Clark, U. S. Commissioner, at La Pine, Oregon, on the 21st day of August, 1920.
Claimant names as witnesses: Kate Zieralf, R. E. Eaton, B. C. Scott, Maude Eaton, all of Lapine, Oregon.
JAS. F. BURGESS, Register.

NOTICE FOR PUBLICATION (Not Coal Land)
Department of the Interior, U. S. Land Office at Lakeview, Oregon, July 12, 1920.
Notice is hereby given that Herman A. Rose, of Lapine, Oregon, who, on April 28, 1916, made Homestead Entry No. 09227, for W 1/2 NE 1/4, Section 15; W 1/2 SE 1/4, Section 10, Township 23 South, Range 9 East, Willamette Meridian, has filed notice of intention to make final three-year proof, to establish claim to the land above described, before E. L. Clark, U. S. Commissioner, at La Pine, Oregon, on the 20th day of August, 1920.
Claimant names as witnesses: R. E. Eaton, Fred Mahn, H. A. Rose, W. G. Fordham, all of Lapine, Oregon.
JAS. F. BURGESS, Register.

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B. L. TONE, Sisters, Ore. adv.190e