Comments and Communications

Natural Vegetation in the Willamette Valley, Oregon

A map of the native vegetation of the United States by H. L. Shantz and Rafael Zon (*Atlas of American agriculture,* Pt. I, Sec. E. Washington, D. C.: Government Printing Office, 1924) shows the Willamette Valley to be covered with Douglas fir timber and makes no distinction between the vegetation of the valley and that of the hills and mountains on either side. In the wall atlas by J. F. Unstead, E. G. R. Taylor, and Geo. Philip, British authors, probably made from records of the Hudson Bay Company, on the map of natural vegetation in the United States, this valley is shown to be a grassland surrounded by fir forests. Which map is right, if either is?

The pioneers found the valley floor largely covered with tall grass, much of which was burned during late summer by Indians during their annual hunts. The following quotations are offered as evidence that neither of the two authorities conveys the correct impression of the country:

"Leaving the Columbia to ascend the Willamette . . ., having passed (the falls at Oregon City) by making a portage, I commenced ascending a clear . . . channel. The banks on either side were bordered with forest trees but behind that narrow belt, diversified with prairie, the landscape was magnificent."—Quoted by R. G. Thwaites (*Early western travels,* Vol. 6, pp. 313–314) from Gabriel Franchere's Narrative, February, 1814.

David Douglas, in his Journal (November, 1826) writes: Along the Langtabuff (now the Long Tom) river—"country open, rich, level, beautiful. . . . We continued (after crossing the Multnomah, now Willamette) our northerly course over an extensive plain intersected by narrow belts of wood and groups of low oaks. . . . At mid-afternoon we came to a small stream flowing in a westerly course to the Multnomah, banks thickly covered with alder, poplar, ash, and willow. (Probably the Calapooia)."

In 1840 the missionary, Rev. G. Hines, wrote in his *Oregon history* (p. 95): "We proceeded southward (from Salem) . . . through a country diversified with rising grounds, . . . fertile valleys variegated with here and there a group of species of red oak and now and then a stately fir which had braved the fury of a thousand storms. At nightfall we camped on the Santa Am's Fork (Santiam) . . . while the fine timber adorning its banks and the extended plains of arable land on each side hold out strong inducements to the immigrant to erect his cabin on its fertile shores."

"Quality (now called Tualatin) Plains are distant twenty-five miles west from Oregon City; they are about twenty-five miles in length, are alternately rolling prairie and timber, surrounded by heavy growth of firs, many of which rise to the height of two hundred and fifty feet," says Gen. Joel Palmer in his Journal of 1845–46 (Thwaites. Vol. 30, pp. 164–190). "The Shahalam (now Chehalem), a small stream, . . . empties into the Willamette (from the west) about twenty miles above Oregon City. It is skirted with good prairies of five or six miles in width near the mountains (Coast): but toward its mouth the valley is covered with timber and fern. . . . On the Yamhill river . . . there are firs more or less along its whole length. From the water courses, upon an average of a little over one-fourth of a mile, the valley is fine prairie land, . . . occasionally interspersed with fine groves . . . and is well covered with grass as every portion of the country that has oaken groves. Between the north and south forks of the Yamhill (west of today's Lafayette) and within six miles of their junction, commences the highlands of the Coast Range; the first plateau is about ten miles wide, and well covered with grass. The second plateau for a few miles is fern openings, with an occasional grove of timber; after this westward to the coast the country is heavily timbered with firs, pine, and occasionally cedar, hemlock, balsam, etc. . . . Upon this (east) bank of the Willamette river ten miles south of Oregon City . . . is a small stream called Pole Alley (now Molalla) which is skirted with beautiful prairie bottoms two to eight miles in length and from one to two miles wide, . . . alternate with groves of fir. Half a mile further south . . . the valley up this (Pudding) river to the Cascades (mountains) is alternately fine prairie and timber lands, with occasional fern openings. It is finely clothed with grass. . . . Eight miles above (the mouth of) Pudding river is a village called Butes (now Butteville). Immediately at this village is a fern opening, covered with an undergrowth of hazel for three-fourths of a mile back, where it merges into an extensive and fertile prairie. . . . From the (Methodist) mission the road proceeds (southward) up the valley, alternately through groves of oak and pine, fern plains, and grassy prairies. . . . The (Willamette) valley at this place (Salem) is about twenty-five miles wide, . . . there are occasional groves of timber interspersing the prairie. The Santiam river banks (20 miles south of Salem) are covered with fir and white cedar of the best quality. This river has four principal branches with several small tributaries, all lined with timber, leaving a strip of beautiful prairie land between each two, from one-half to four miles in width. . . . After leaving the Santiam (southward), a prairie commences, of from four to twelve miles in width, which continues up the valley for a day's travel, I suppose about forty miles. The Willamette valley . . . is beautifully diversified with timber and prairie. The Willamette . . . river itself, throughout its length, has generally a (border) growth of fir and white cedar, averaging from one-fourth to three miles in width."

As demonstrated by numerous descriptions, of which the foregoing excerpts are typical, the pioneers found the Willamette Valley to be a mixed grassland and timberland. There are numerous areas of timber today on land

that has never been under the plow. Most of them were here as larger areas of smaller trees and bushes when the first white people came.

It is well known that soil scientists (Department of Soils, Oregon State College, in consultation) are able to distinguish between forest soils and grassland soils from the characteristics imparted to each by its former vegetative cover. They find here that most of the soils on relatively high elevations on the valley floor are forest soils and that most of those relatively lower and not so well drained have not been covered with timber, thus substantiating the recorded observations of the pioneers. Hence, a map of the natural vegetation of the Willamette Valley should show it as a grassland with a timber cover of less than one-half—probably about one-third or more—of the area of the valley floor.

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A Tree-Trunk Squeeze-Up in Lava

A squeeze-up is a lava mass which was forced upward, while still of semiliquid consistency, through an opening in the hardened surface crust of the flow. Several types of squeeze-ups have been reported by Nichols (*J. Geol.*, 1939, **47**, 421–425) for the 220-square mile basalt flow of Recent origin south of Grants, Valencia County, New Mexico, which different authors have termed the Grants or McCarty's Lava Bed or the Aqua Fria Malpais.

An apparently undescribed type of squeeze-up is found in the eastern edge of the northwest lobe of this flow near the Ice Caves Resort, in Section 20 of the township which includes Paxton Springs. A few yards behind the resort headquarters building, near the southeast base of Flagpole Cone, are five or six vertical cylindrical holes in the lava, the largest 18″ in diameter and at least 5′ deep, the exact depth being obscured by accumulated rock fragments. These are popularly known as "devil's smokestacks." The tubes were produced by the flow of magma around standing tree trunks near the edge of the bed where the depth and pressure were relatively limited. No organic material remains, but one of the tubes has markings inside which strongly suggest a mold of the bark of yellow pine (*Pinus ponderosa*). Most of the tree tubes end flush with the rather smooth surface of the pahoehoe lava, but some show a low, weathered rim around the top of the tube, several inches above the general surface. The nature of the rim will be clearer from the following account.

One-tenth mile farther north along the flow's edge is found the best example of a tree tube, combined with an excellent example of a tree-trunk squeeze-up. The cavity is 110″ deep to the present bottom. The inside diameter of the tube averages 17″. A rock chimney readily seen from the Ice Caves branch road, projects 23″ above the horizontal lava surface. The diameter of the tube within the chimney is the same as that below the general surface. The thickness of chimney's wall ranges at different points from 7″ to 10″; the average is about 8″. The inside of the chimney is circular in cross section; the outside, of subcircular form. Close examination of the vertical wall and base of the chimney reveals parallel striations running vertically on the unweathered surface, which extends upward for a maximum distance of 10″. Above this basal portion, the chimney surface is weathered and irregular, and the broken top indicates that this peculiar hollow cylinder of lava once had a greater height. The external basal striations provide proof that the chimney originated as a squeeze-up. As the surface crust cooled and hardened, its shrinkage, in combination with the charring of the tree trunk's outer tissues, may have been sufficient to permit the soft viscous magma beneath to be squeezed between the remaining wood and the hard circular edge of the cooled crust. Irregularities in the latter left their marks formed as vertical striations during upward movement of the semiliquid ring. It is probable that for a chimney wall of such thickness to result, an additional factor was necessary—the removal of fragments from the edges of the crust by the pressure from beneath, widening the gap between the tree trunk and the firm crust.

Vertical ridges as much as ⅜ of an inch high occur sparsely on the inner surface of the tube proper below the chimney. These are connected by horizontal ridges, in lower relief, to form square markings. The latter are too regular in size and shape to be interpreted as the mold of tree bark. If it were not for a smaller secondary system of squares within the major system, there would be a superficial resemblance to the distinctive bark of alligator juniper (*Juniperus pachyphloea*) which grows in the immediate vicinity. The markings strongly suggest the "boxwork" found on the walls of certain caves, but with much lower relief than typical "boxwork." No explanation for the pseudo-bark markings can be offered. The Recent date of the flow, aridity of the climate, fissured and permeable character of the lava, and topography make it highly unlikely that this tube ever filled with water up to the level of the markings, 80″ from the bottom.

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Climatic Changes and Dark Nebulae

In the abstract of Donald H. Menzel's centennial symposium paper, "The Sun and the Earth," (*Science*, November 26, p. 590) there is a discussion of the possibility of climatic change being due to the passage of the solar system through dark nebulae or clouds of dust. The following statement is made: ". . . there is one other possibility to consider—a possibility that has not been previously suggested, to my knowledge." I wonder if Huntington and Visher did not discuss something similar to the above idea of climatic change in their book *Climatic changes* (Yale University Press, 1922, pp. 247–249).

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