THE LAVA PLAINS OF IDAHO.

BY PROF. G. F. WRIGHT, D.D.

The extent of the lava beds covering the surface west of the Rocky Mountains is almost incomprehensible, and until the facts were established by repeated observations the reports concerning them were regarded as incredible. But literally hundreds of thousands of square miles in British Columbia and southward along the Pacific slope and through the great interior basin to Mexico are covered with lava of a very recent age. Though there are no existing volcanoes in the region, abundant evidence exists that extensive volcanic eruptions have occurred there, not only since man appeared, but even within a few hundred years. But the most of the lava must have poured out of the earth, not in craters, but through extensive fissures, now buried beneath the abundant volcanic material that has come up through them.

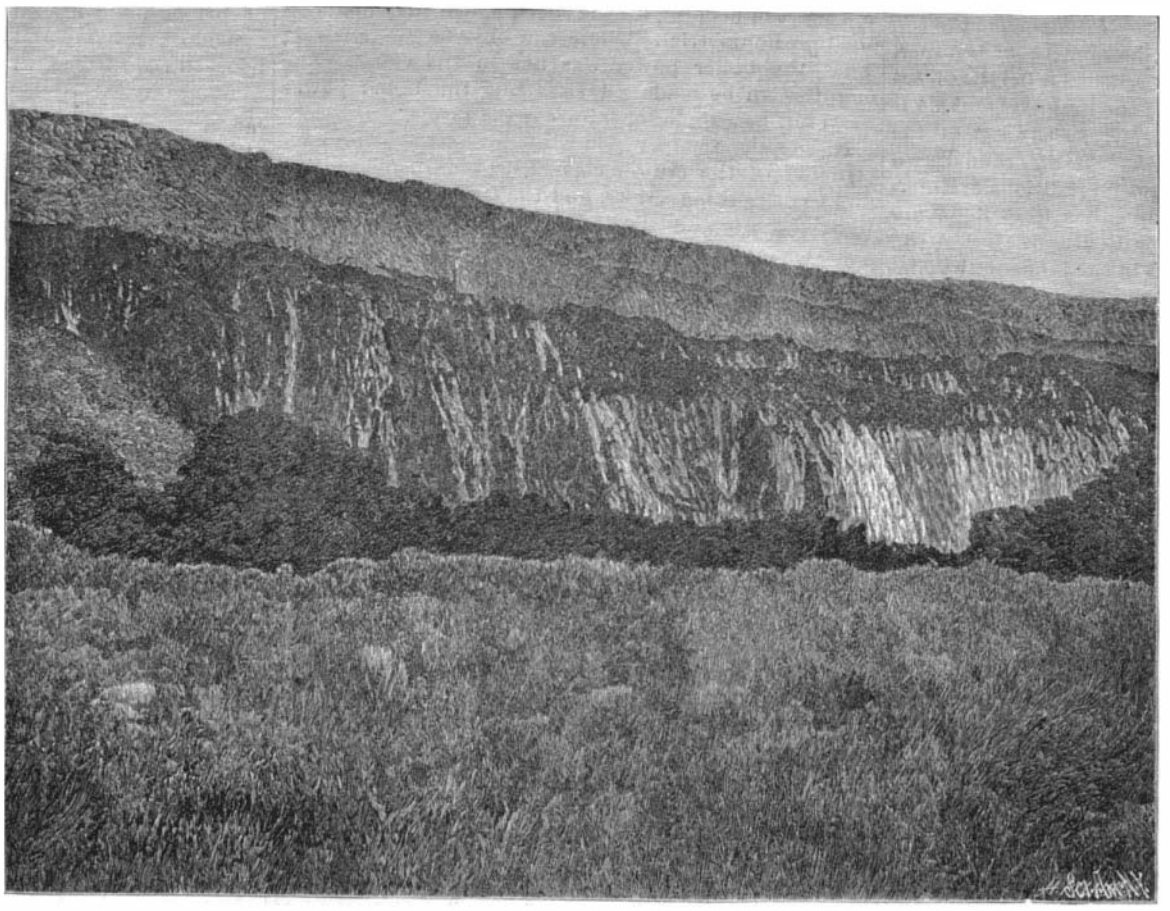
The lava deposits of Oregon and Washington are more extensive than those of Idaho, but it is hardly possible that they can be more interesting. The cañon of the Columbia River, where it has cut through the Cascade Mountains, between Oregon and Washington, is entirely in basaltic lava of recent geologic date, and is from 3,000 to 4,000 feet in depth. In Idaho the lava is largely limited to the Snake River Valley, which it has filled up to a definite level between the mountains on either side, looking, verily, like a vast lake which has been suddenly congealed in the midst of a storm. Not far from 12,000 square miles of this area consists of gently rolling swells of vast lava deposits, much of which looks as fresh as the slag which came out of the furnace but yesterday. Over hundreds of square miles there is not sufficient soil for any green thing to exist, and over the larger part of the whole area, owing both to lack of soil and to lack of moisture, nothing but stunted sage bush can grow.

Through this weary waste, the Snake River windsits way, having worn for much of the distance one of the most remarkable cañons anywhere to be found in the world. Coming down from the Yellowstone Park and Teton Mountains, the Snake River enters these lava plains near Eagle Rock, and for about 150 miles flows not far below the general level of the country. Through this part of its course the water of the river is, to a considerable extent, available for irrigation, and several hundred thousand acres of land have been brought under cultivation by that means; the chief drawback being the high altitude (from 4,000 to 5,000 feet above the sea), which greatly limits the variety of crops.

Near the 37th meridian the river enters the famous canon which occasioned such distress to the early emigrants and explorers. It was here, not far below Starr's or Rice's Ferry, that Astor's party, in 1811, lost their boats, and entered upon the unknown and almost unexampled perils that were before them. In a space of fifty miles the river falls no less than 1,400 feet, while the general level of the lava plain falls but 400 feet. The course of the river for this whole distance is through a narrow gorge, with precipitous walls of columnar basalt on either side, and during much of the way it is absolutely inaccessible. It is quite possible here for men to upon the brink of the river and die from thirst, ... abundance of water in the bottom of the cañon in full view.

At Shoshone Falls the great river, after having flowed for nearly fifty miles in this deepening cañon, until its bed is already 700 feet below the level-topped lava on either side, makes another plunge of more than 200 feet, forming one of the most impressive cataracts in the world. Below the falls for many miles the river flows through a cañon 1,000 feet in depth and not much more than that in width, with walls so abrupt that at almost any point a stone can be thrown from the edge of the precipice into the flowing water.

Up to this point great schools of salmon from the Columbia River are able to press their way, and where the river is accessible it has been a famous gathering point for the Indians to lay in their annual store of fish. Salmon Falls, some thirty or forty miles below Shoshone Falls, are only from fifteen to twenty feet in height, and in the proper season of the year a ceaseless line of salmon may be seen endeavoring, with more or less success, to jump the falls and attain the more quiet water above.



THE THOUSAND SPRINGS, SNAKE RIVER CAÑON.

The view shows the north wall of Snake River cañon, near Salmon Falls. Height of wall, 380 ft. The "Thousand Springs" are seen coming out from the precipice 180 ft. below the top.

SHOSHONE FALLS AND CAÑON OF SNAKE RIVER.

Walls of cañon of basalt, 1,000 ft. high. Falls, 230 ft. high.

A point of chief interest in my investigations last summer was found about ten miles above Salmon Falls. Here the lava appears only upon the north side of the river, abutting upon the narrow valley in a precipice 380 feet in height. Out of the face of this precipice, through channels worn between lava beds of successive periods, there bursts a most remarkable series of springs. The line of their exit is 200 feet above the river, and 180 feet below the top of the precipice. The supply of water is enormous, and is said to be constant through the year. Mr. A. D. Foote, an eminent hydraulic engineer, told me that, according to his rough estimate, these springs furnished, in a space of three miles, no less than 4,000 cubic feet of water per second, and Mr. F. J. Mills, an equally competent authority, assured me that during the dry season these springs nearly doubled the flow of water in the Snake River at that point.

The origin of these streams becomes apparent upon a general study of the lava beds above. For 300 miles the lava is continuous upon the north side of the river, and throughout this distance the Snake River does not receive a single superficial tributary from the north. But upon going over to the farther edge of the lava, where it abuts against the foot hills of the extensive mountains beyond, we find that numerous rivers of considerable size come down from them, and disappear in the lava plain. Camas Creek, Beaver Creek, Medicine Lodge Creek, Birch Creek, Little Lost and Big Lost Rivers are some of the streams which thus disappear. Doubtless it is the waters from these streams, after wandering, much of it, for hundreds of miles in underground passages, which burst forth in such a remarkable manner from the face of the cliffs near Salmon Falls.

Hoping to utilize this water for irrigating purposes, Mr. Mills surveyed the region for the United States government, but found that the surface of the plain accessible below was higher than the exit of these springs. When, however, population shall press more closely upon the resources of nature in our country, we may be sure that all this water will be made available. To say nothing of the mechanical power that might be used for manufacturing purposes, a part of the water may some time be used to pump the other part up to the level of the surrounding plains, and thus transform a portion of them from dreary wastes to fruitful fields.

To those who may have read in the SCIENTIFIC AMERICAN for November 9, 1889, my account of the little clay image found at Nampa, Idaho, beneath thin lava deposits, at a depth in all of 320 feet below the surface, a single word concerning the situation there may be acceptable. Nampa I found to be not more than five miles from the extreme western edge of the great basaltic plains of the Snake River Valley, and the lava, which is hundreds of feet thick to the east, had there thinned out to a thickness of 15 feet, and was flowing over unconsolidated strata of clay and quicksand. Nothing appears, therefore, in the circumstances to throw any doubt over the genuineness of the discovery, and its date remains to be approximately ascertained by studying the erosion of the rivers which has

taken place in this part of the valley. I have not at present worked out the problem sufficiently to make such an estimate, but can only say in general that while geologically the strata are very recent, they are, as we reckon human history, very ancient, and closely correspond in their age to the human relics reported by Prof. Whitney and others in the gold-bearing gravels under the lava deposits of Table Mountain, in Calaveras and Tuolumne Counties, California. Evidently, therefore, the Scripture saying is here again fulfilled, that "the first shall be last, and the last shall be first." For the portion of the continent earliest occupied by man will only now in these late days be ready to be reoccupied when the great hydraulic schemes inaugurated for irrigating this region shall have been carried out and made realities.

THE WASHINGTON BRIDGE.

This beautiful structure, completed in December, 1888, at a cost of $2,851,684, and accepted from the contractors in March, 1889, appears to be still under the control of the bridge commissioners, not having been officially turned over to the city, although it has been for more than two years in public use. It connects Tenth Avenue at 181st Street, on the west side of the Harlem River, with Aqueduct Avenue on the east side of the river, the length of the bridge and approaches being 2,375 feet. It has two steel arches, each of 510 feet span, giving a clear height of 133 feet above the water, and its roadway is 80 feet wide between the parapets, 50 feet being a carriage-way, while there are two sidewalks, each 15 feet wide, protected by heavy balustrades of iron and bronze. The three main piers are 40 feet thick at the point from which the steel arches spring, and 98 feet long, and the abutments on each side are formed of three semicircular masonry arches, each of 60 feet span. The weight and thrust of the six steel ribs forming each arch are borne by large blocks of granite set normal to the thrust, and backed by granite blocks and concrete. Above this the piers are cellular, the main piers and abutments being crowned with a deep bracketed cornice with parapet.

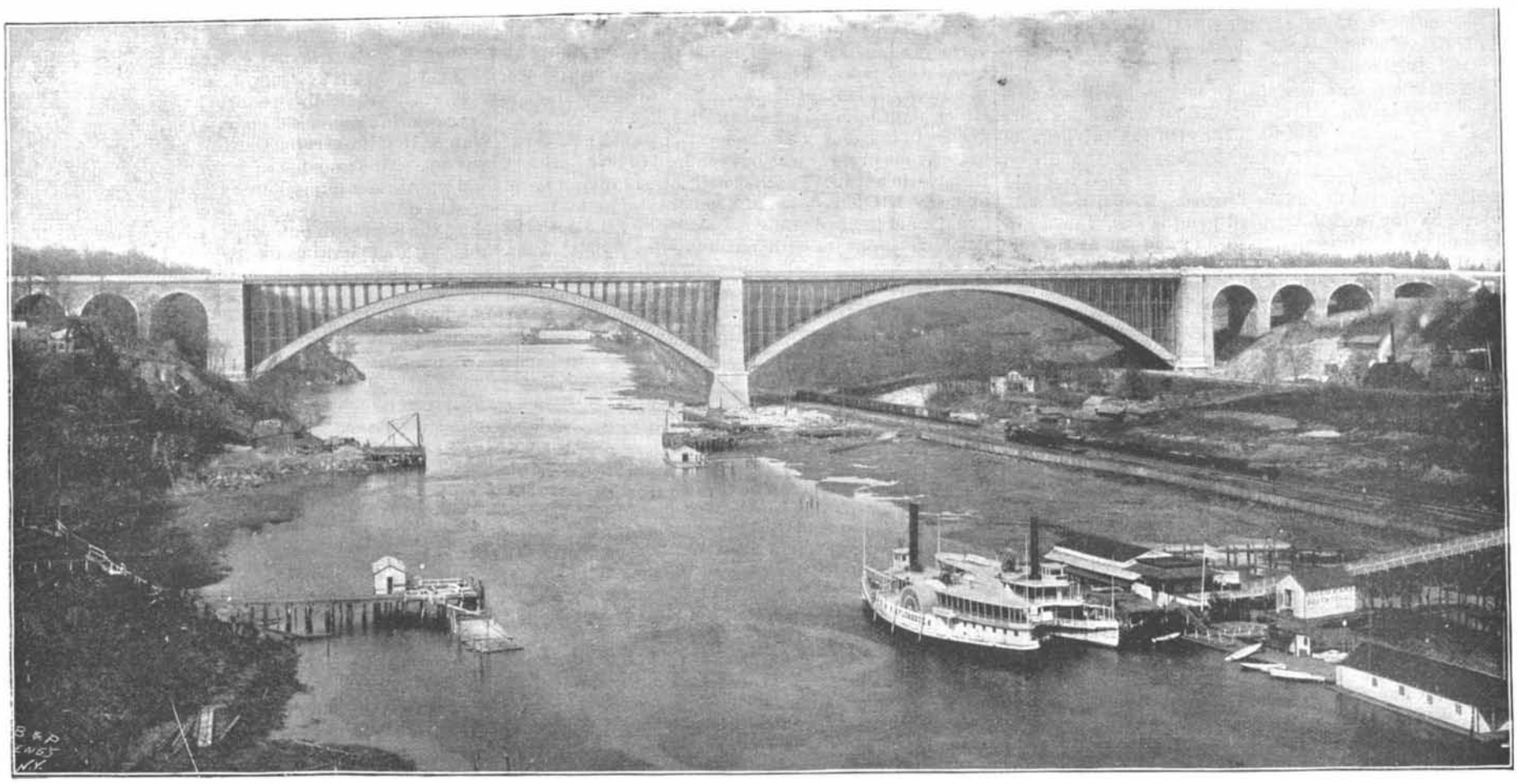
On the western side of the river, where the bluff rises abruptly from the water, no difficulty was experienced in getting a good rock foundation, but the central pier was built with the aid of a caisson, and it was necessary to go 40½ feet below mean high water before a suitable rock foundation was reached. The foundation of the eastern main pier was carried down 43 feet, and laid on a bed of concrete 6 feet thick. More than 40,000 cubic yards of dressed granite and gneiss were used in the bridge, costing $827,000, and there are 7,550,000 pounds of steel in the arch ribs and bracing, and nearly 6,000,000 pounds of iron in the posts, bracings, and floor, besides 1,234,000 pounds of cast and wrought iron in the cornice and balustrade, the iron and steel used costing a little over $900,000.

WE are informed that at Spikenard, Jackson County, Oregon, asbestos, of all grades and in large quantities, has recently been discovered, and active preparations for working the various fields are being made. The mines are near good roads, with plenty of timber and water power close at hand.

The Tennessee River Improvements.

In addition to the many rock reefs and other minor obstructions, the Tennessee River is divided into two sections, which were, until recently, entirely isolated from each other by the chain of reefs and rapids known as the Muscle Shoals (near Chattanooga). More than sixty years ago steps were taken to build a canal around this obstruction, and a canal was finally built, but it soon became useless from damages caused by heavy floods, and for want of funds to make repairs it had to be abandoned. Some eighteen years ago an appropriation was made for rebuilding the canal, and within the past year the work has been so far completed as to permit the passage of boats, though much work still remains to be done to give a satisfactory channel through this obstruction and to complete the removal of minor obstructions in other parts of the river.

Without going into details, it may be stated that the Muscle Shoals improvement consists of 16 miles of canal and 12 miles of open channel work. The canal is from 80 to 120 feet wide and has eleven substantial locks of cut stone, 300 by 60 feet in the chamber, and with lifts varying from 5 to 13 feet. The lock walls, placed end to end, would make a wall 18 feet high, 7 feet thick, and 2 miles long. Over 270,000 cubic yards of solid rock have been blasted from the bed of the river and canal trunk, more than a million cubic yards of earth excavated, and half a million cubic yards of embankment built. Two thousand two hundred and seventy-eight tons of iron were used in the construction of the lock gates and aqueduct, and two and a half miles of heavy stone dams have been built.—*W. R. King.*



THE WASHINGTON BRIDGE OVER THE HARLEM RIVER, AT 181ST STREET, NEW YORK CITY.

Poor Speed of the New British Fleet.

The London *Times* correspondent's letter from the fleet recently confirmed entirely our view of the failure of the new fleet to attain the speed for which it was designed. "Last night's speed," he writes, under date of July 31, "was rather more than thirteen knots, and though at that speed the Hero and Conqueror, and especially the former, were at times appreciably astern of station, they would have been perfectly able to keep station throughout a series of tactical evolutions conducted at a speed of twelve to thirteen knots. On the other hand, it seemed as if the torpedo gunboats, which are supposed to have a speed on paper of twenty-one knots with forced draught, could only maintain the speed of the squadron with considerable difficulty. The smoke they emitted gave signs of assiduous stoking, and as night fell, the Sheldrake in particular frequently exhibited a pendant of murky flame at her funnel. I noticed this morning that both her funnels were very much blacked with the heat." Yet none the less, instead of attaining the paper speed assigned to them, these torpedo gunboats could hardly sustain the far inferior speed of thirteen knots. The Sharpshooter, for instance, was estimated to attain twenty-one knots, and its machinery, planned for the purpose, cost more than double that of the machinery of the Redpole, a slow boat. Yet it hardly at all exceeded the speed of the Redpole, so that all the enormous extra cost of its machinery was, as far as speed was concerned, utterly wasted. There is something rotten in the execution of these torpedo gunboats. We believe that it consists in the nervous dread felt of the new boilers, and in the expensive expedients which are fruitlessly tried in the hope of making the old boilers more effective.—*Spectator.*

Use of Hyoscine.

In a paper in the *Journal of Mental Science* Dr. Lionel Weatherly has a very strong word to say in favor of hyoscine in certain conditions. There is little doubt that his warning against mistaking it for hyoscyamine is not unnecessary, and it is now high time that it should be recognized that in these two substances we have to deal with alkaloids of very different characters, from the point of view at least of the clinical physician. Dr. Weatherly believes strongly in the powers of hyoscine as a mental alterative. He has found it particularly useful in that form of mental disturbance which renders the patient violent and abusive, restless and domineering—a nuisance to every one who has anything to do with him. Under the administration of repeated small doses of hyoscine such a patient becomes a changed man. Violence and abusiveness give place to an amiable politeness, and instead of indulging himself in the free exercise of an extensive if somewhat shady vocabulary, the patient subsides into silence. Those are the cases in which Dr. Weatherly finds the drug most useful, and in which he believes it acts as a true mental alterative. It is also, he says, a useful drug in delirium tremens, and in other diseases in which tremor is a marked symptom, such as disseminated sclerosis, and it has the great advantage of being in most circumstances quite safe. It is not without reason that Dr. Weatherly enters a word of warning against its indiscriminate use as a sudden and powerful hypnotic; yet there would appear to be no doubt that it finds its greatest, and probably its most useful, application in the treatment of maniacal violence and noisiness, and that, at least in ordinary hospital work, it is a drug for emergencies.—*Lancet.*

Stimulation of Muscle by Light.

To the usual well known ways of stimulating muscles to contraction, viz., electrical, thermal, mechanical, and chemical, M. D'Arsonval has, says *Nature*, recently added that by means of light. He could not, indeed, get any contraction in a fresh frog muscle, when he suddenly threw bright light on it in a dark chamber; but having first in darkness stimulated a muscle with induction currents too weak to give a visible effect, and then suddenly illuminated the muscle with an arc light, the muscle showed slight tremulation. Not thinking this conclusive, however, M. D'Arsonval attached a muscle to the middle of a piece of skin stretched on a funnel, and connected the tube of the funnel by means of a piece of India rubber tube with the ear. The muscle being now subjected to intense intermittent light, he heard a tone corresponding to the period of illumination, and this ceased when the muscle was killed with heat. Arc light was used, which was concentrated by a lens and passed through an alum solution to stop the heat rays.