

ORIGIN OF THE DEPRESSION KNOWN AS MONTEZUMA'S WELL, ARIZONA.

THE singular bowl-shaped depression known as Montezuma's Well on Beaver Creek, Yavapai County, Arizona, is one of the noted natural wonders of that territory. It is frequently visited by tourists and others who get so far into the interior of Arizona as Camp Verde, from which the well is twelve miles distant. Hinton in his 'Handbook of Arizona' (1878) gives a fair representation, by a wood-cut, of one side of the well.

The depression is in the midst of a nearly level area; it is nearly circular, 500 to 600 feet in diameter, with vertical walls, or sides, from 30 to 40 feet downwards to the head of a talus slope extending to a circular pool of water, said to be of unfathomable depth.

The popular theory of the origin of this cavity and well in the plain is that it is volcanic; a crater, like a pit-crater. While there is a resemblance in form to a pit-crater there is no other point of resemblance. There are no volcanic rocks or traces of lava, except numerous broken metaltes left by the ancient cliff-dwellers who once dwelt in the cavernous spaces in the limestone walls around the pool. The water is not stagnant, it flows out by a subterranean channel to the adjoining valley of Beaver Creek, from which, probably, the supply is received at some more remote point above.

This depression is evidently the result of caving-in, a falling down, of the roof of a cavern formed by running water in the nearly horizontal limestone strata. Most of the débris of the former roof which was engulfed in the cavern has no doubt been largely dissolved and washed away by the flowing water.

The existence of once inhabited rooms, or chambers, around the well in the overhanging limestone cliffs, and also of extensive ruins of stone buildings above, around the borders of the depression, confirms the other evidences of the great antiquity of the well.

There are other peculiar basin-shaped depressions in the general surface in the vicinity of Flagstaff and Walnut Creek in Coconino County whose origin may be similarly explained or, perhaps, referred to the solvent

action of surface waters sinking or percolating downwards through calcareous strata to some subterranean channel, or by subterranean streams.

The peculiar depressions in the soil of the lead and zinc region of Wisconsin, often seen at intervals along certain lines upon the surface, may be similarly accounted for. They indicate the downward flow of solvent waters to and along the 'crevices' in the horizontal limestones and thus are indicative of lodes or of ore to the miners.

The foregoing described phenomena suggest that the remarkable crater-like cavity known as 'Coon Butte Crater' may have similarly originated. This suggestion is made with some reluctance, inasmuch as I have not studied the locality. But it seems as if all the conditions so well and fully described by Mr. D. M. Barringer, and Mr. Tilghman, in their memoirs (*Proceedings of the Academy of Natural Sciences of Philadelphia*, December, 1905) may be explained upon the hypothesis of a sink or downward flow of surface (meteoric) water carrying away by solution the lime of the calcareous sandstone, reducing its volume, or forming cavernous spaces, which permitted the upper unsupported beds to fall in. Such solvent action would leave the silica of the calcareous sandstone in a divided pulverulent condition, much as it is found, with here and there portions with less lime or less decomposition. The subsidence of the area would carry down with it any meteoric fragments which were on the surface or in the soil, and to considerable depths.

The numerous masses of iron oxide or 'magnetite,' as described, are doubtless the residual fragments of siderolites originally highly charged with nodules of sulphides and phosphides, and probably with chlorine. The continuous oxidation and exfoliation of some meteorites, even when protected from the elements in museums, are familiar examples.

WM. P. BLAKE.

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QUOTATIONS.

THE HUXLEY LECTURE.

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