What Geology to See—*Continued*

Colorado. This is about 5 miles below the town of Gypsum. It can be seen from the auto road and also from the trains of the Denver and Rio Grande Western Railroad.

DIKE—Dikes of hardened lava that has been forced up through some crack in the rocks are quite abundant, but few of them are large enough or hard enough to make much of a showing. (1) The largest dike in the country is one of a great system of dikes that ray out from the Spanish Peaks in Las Animas County, Colorado. The largest of these extends northward from West Spanish Peak along the west side of Guajaytoyan Creek to within 4 miles of the village of La Veta on the La Veta branch of the Denver and Rio Grande Western Railroad. This dike has the appearance of a great rock wall which in places is more than 100 feet high.

COLUMNAR LAVA—Some masses of molten rock on cooling develop a wonderful system of hexagonal prisms, perpendicular to the cooling surface. (1) Two notable examples of columnar structure may be seen in northeastern Wyoming. One of these is the Devil's Tower, 25 miles northeast of Moorcroft and the other is called Inyankara, 30 miles east of Moorcroft. (2) There are many features of this kind in the lava fields of Washington. One is at Cactus Siding, 5 miles south of Connell on the Northern Pacific Railway and another is in Yakima Canyon a few miles north of North Yakima.

Economic Materials

LARGE COAL BED—Coal beds are of such common occurrence that few stop to consider them, largely because they are rarely exposed in full thickness. A few localities will be given where the full thickness of the bed may be seen. (1) The full thickness and character of the celebrated Pocahontas No. 3 coal bed has been preserved at the type locality, Pocahontas, Tazewell County, Virginia, and can be readily seen without difficulty. The coal bed is nearly 11 feet thick and contains as fine steaming coal as any other coal bed in the world. (2) A coal bed 20 feet thick can be seen at Streator, about 12 miles northeast of Meeker, Rio Blanco County, Colorado, on the main road leading from Meeker to Craig. (3) Perhaps the most remarkable exposure of coal is to be seen in a strip pit which has recently been opened by the Northern Pacific Railroad Company in sec. 35, T. 2 N., R. 41 E., about 25 miles due south of Forsyth, Montana. This coal bed is 27 feet thick and the whole amount is mined or quarried with steam shovels.

SALT CRUST—The salt crust of Death Valley, Inyo County, California, is a very interesting feature, though it has not yet been used in a commercial way. This field of salt is 2 or 3 miles wide, 10 or 15 miles long and consists of a crust of salt several feet thick. The salt is very impure and it forms in pinnacles several feet high which make it difficult to cross, except where the pinnacles have been beaten down into a road. Any road leading to the Furnace Creek Ranch in the northern part of the valley will bring the visitor to this salt field.

OIL SHALE—Most persons are interested in the great reserves of oil shale which have been reported in several of the western states, but few have any idea of the appearance or character of these shales. The best place to see them is at Grand Valley, Garfield County, Colorado. Here the cliffs of oil shale are near the railroad and the auto highway and the shale can readily be examined. Most persons think of oil shale as containing oil, but on these shales he will see no signs of oil. In fact the oil can be obtained only by the distillation of the organic material that causes the shale to have a dark color.

Geologic Structures

ANTICLINE—Anticlines are great arches in the rock; these may be very elongate and are then called arches or may be as broad as they are long and when of such a shape are called domes. (1) Arches in the rocks are very common in the Appalachian region. One of the best of these and at the same time one that is easily accessible is just west of Cumberland, Maryland. This great anticline in massive sandstone has been cut by Willie Creek until the complete section of the arch is exposed. (2) Another anticline that is equally well known and accessible is the sandstone arch at the Iron Gate just east of Clifton Forge, Virginia. (3) The celebrated Teapot Dome oil field north of Casper, Wyoming, is a dome-shaped anticline, but the structure is not apparent at the surface as the rocks are too soft to preserve the dome. The adjacent oil field—Salt Creek field—is a slightly irregular dome outlined by the Rim Rock which once arched up and covered the entire structure. These fields are easily accessible and will well repay a visit.

Geological Guidebooks

Geology

These publications are out of stock for free distribution, but can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Bulletin 611, Guidebook of the western United States, Part A, The Northern Pacific Route, with a side trip to Yellowstone Park, by M. R. Campbell and others, $1.00.

Bulletin 612, Guidebook of the western United States, Part B, The Overland Route, with a side trip to Yellowstone Park, by W. T. Lee, R. W. Stone, H. S. Gale, and others, 50 cents.

Bulletin 613, Guidebook of the western United States, Part C, The Santa Fe Route, with a side trip to the Grand Canyon of the Colorado, by N. H. Darton and others, $1.00.

Bulletin 614, Guidebook of the western United States, Part D, The Shasta Route and Coast Line, by J. S. Diller and others, 50 cents.

Bulletin 707, Guidebook of the western United States, Part E, The Denver & Rio Grande Western Route, by M. R. Campbell, $1.00

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Of Taming Dragons

Volcanology

In Sonoma County, California, near the town of Cloverdale, there is an industrial development, unique in this country and one of only two enterprises of its kind in the world, that will repay a brief visit by physicists, engineers and geologists. It is the effort to carry out the ancient and much-talked-of project to capture and utilize natural heat under the surface of the earth.

At "The Geysers" the effort is, to be sure, a fairly modest one. There is nothing here of the ten-mile-deep shaft talked about by Professors of Romantic Engineering, no effort at a Vernian or Wellsian tunnel through the earth. The promoters of this enterprise are contenting themselves with drilling into a place where the heat has accommodatingly come near to the surface, in the form of hot springs, and leading up the steam they find in casings not unlike those employed in oil or artesian wells. They declare their wells are working, and that they will pay. "The Geysers" is worth looking at, anyway.

The scientific aspects of the enterprise have been studied by Dr. E. T. Allen and Dr. A. L. Day, and are reported under the title Steam Wells and Other Thermal Activity at "The Geysers," California, published by the Carnegie Institution of Washington.

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