GYPSUM AND PLASTERS.

GYPSUM OF THE UNCOMPAHGRE REGION, COLORADO.

By C. E. Siebenthal.

Location.—The gypsum measures herein described are located on the west side of the Grand Canyon of Gunnison River, partly in Delta County and partly in Montrose County, Colo., as shown on the accompanying sketch map (fig. 16). The eastward extension of the measures across the canyon, in all probability, likewise contains extensive deposits of gypsum, but as they are accessible only with much difficulty from the west side of the river they were not visited, though their position has been indicated on the map.

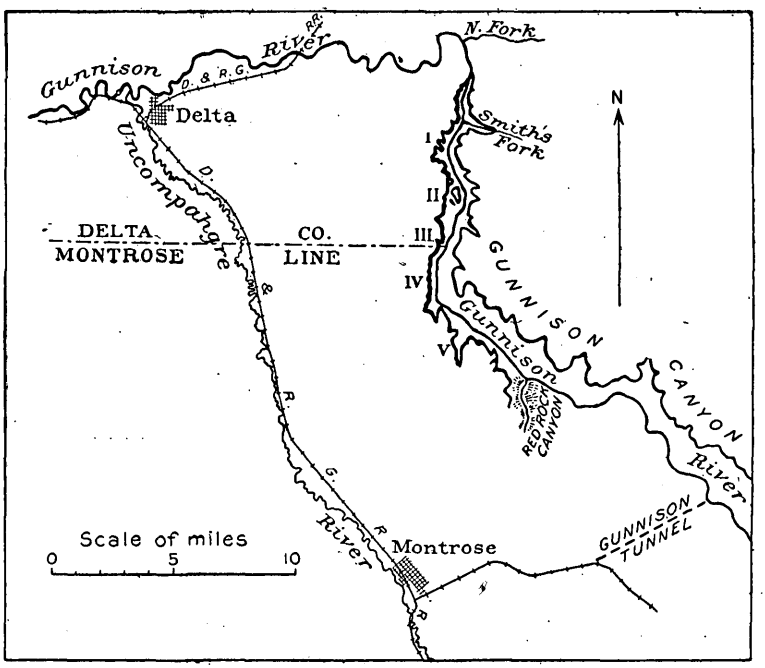

FIG. 16.—Gypsum measures of the Uncompahgre region.

Structure.—From the intake of the Gunnison tunnel the river flows northwestward for 18 miles and then due north for 12 miles, thus skirting the southwest and west edges of the Mesa Inclinada. This course approximately coincides with the asymmetric anticline which changes the gentle northeast dip of the mesa to a steeper southwest dip in the territory bordering the 18 miles of canyon on the southwest and to a west dip in the lower 12 miles of its course. The Mesa Inclinada is a dip or structural slope of between 2° and 3°,

the surface of which is formed by the "Dakota" sandstone. The same sandstone, for the most part, forms the crest of the ridge which borders the canyon on the west. The river has cut through the sandstone and underlying formations and, in the south part of the area, has cut 2,500 feet into the crystalline complex. Near the north edge of the area the northward slope carries the schists below drainage.

Geology.—Overlying the schists is a bed of massive, fine-grained sandstone of a pinkish to yellowish or salmon color, weathering with characteristic rounded outlines, concave and convex. The thickness of this bed in the southern part of the area is about 100 feet, thinning to the northward to about 50 feet. The upper part becomes flaggy, then shaly, and passes upward into the gypsum measures, which are in turn succeeded, either directly or with an interval of 30 to 40 feet of shales and sandstones, by 40 to 50 feet of blue calcareous shale, with interbedded flaggy, drab limestones, containing a few fresh-water fossils. This is followed in turn by 400 feet of variegated, but predominantly reddish shales, with interbedded red and buff sandstones. The so-called "Dakota" comes next and completes the section of the canyon wall. It consists at the bottom of from 40 to 60 feet of massive coarse-grained, buff sandstone, with sheets and strata of conglomerate, the pebbles averaging one-half inch in diameter and consisting of jaspers and cherts of various colors. The upper member of the formation consists of similar sandstones, usually not so thick, less massive, and with less conglomerate. Between the sandstone members is a series of interbedded dark shales and buff sandstones, with here and there thin beds of coal. The thickness of the whole "Dakota" series is about 200 feet.

Gypsum measures.—With an average thickness of 110 feet and a maximum thickness of 150 feet, gypsum measures outcrop in the west wall of Gunnison Canyon uninterruptedly from a point below the mouth of Smiths Fork southward to Red Rock Canyon, a distance of 20 miles. Immediately west of Red Rock Canyon they cross over the divide between Gunnison and Uncompahgre rivers and plunge sharply beneath the rocks of the Uncompahgre Valley. From this point southeastward along the faulted anticline which marks the west limit of Vernal Mesa the gypsum measures are either wanting or concealed by débris, except at two points along the Tunnel road in sec. 17, T. 49 N., R. 7 W., where thin beds of gypsum appear.

The stratigraphy of the gypsum measures is well shown in the following sections, taken at different points along the west wall of the canyon:

Sections showing gypsum measures in Gunnison Canyon, Colorado.

I.

	Feet.
Shale and sandstone; gypsum in gash veins and lumps constitutes one-third of the whole	30
Solid granular white gypsum	10
Solid gypsum, with some shale near top	30
Red to green clay, gypsiferous	14
Solid granular gypsum	25
Concealed, shale at top	20
Solid white gypsum	4

II.

Gypsiferous sandstone	11
Nearly solid gypsum, shale one-fifth of whole, some lumps of limestone	60
Bluish gypsiferous shale; bands and gashes of gypsum	36
Sandstone	6
Solid gypsum	4
Arenaceous gypsum	4
Reddish gypsiferous shale	13
Solid gypsum	8

III.

Clay and gypsum; gypsum perhaps one-third of whole	44
Shale and arenaceous gypsum	48
White gypsum rock	5

IV.

	Feet.
Blue gypsiferous shale	6
White massive sandstone	5
Sandstone and shale	8
Shale with gypsum in plates and gash veins	4
Solid white gypsum	4
Gypsiferous shale	7
Solid gypsum	1
Gypsiferous sandstone	2
Shale	4
Gypsiferous sandstone	2
Shale	2
White granular gypsum	2
Shale	8
Gypsiferous sandstone	18
Red shale	12
Soft white gypsum	8
Gypsiferous sandstone and shale	40

V.

Shale and sandstone, with gypsum in beds	6
Gypsiferous sandstone	40
Pinkish to red sandstone	22
Gypsiferous sandstone	4
Arenaceous shale, gypsum	22
Solid white gypsum	8
Arenaceous shale, gypsiferous	35

Section I is under the big hill at the west bend of the river, 2 miles southwest of the mouth of Smiths Fork.

Section II is at the big hill 2 miles south of Section I.

Section III is near the sharp eastward bend of the river in sec. 23, T. 51 N., R. 9 W., about 3 miles south of Section II.

Section IV is at the low gap 2 miles south of Section III.

Section V is 3 miles south of Section IV and 2 miles due east of Devils Elbow.

In the foregoing sections, where solid gypsum appears, it was seen at the surface, but the gypsiferous shales and sandstones disintegrate very easily, and the surface is covered by a deep mantle of loose sand and clay which undoubtedly conceals many beds of rock gypsum.

The great variability of the gypsum measures from place to place is well shown in the sections, the only persistent member being the bed of gypsum from 4 to 8 feet in thickness which appears at or near the base of each section.

Along that portion of the outcrop covered by the sections given above, the surface is so steep that mining would be necessary from the start. The most easily accessible gypsum is that at the low gap where Section IV was taken. The top of the gypsum measures is about 150 feet below the gap, which may be reached by an easy grade from the county road to the west.

Between Red Rock Canyon and the locality of Section V there is a hill sloping gently westward, the surface of which is a dip slope composed in part of the gypsum measures. In this region in places the gypsum beds lie near enough to the surface to strip, thus saving the expense of mining, but on the other hand they are a thousand feet higher than the deposit at the gap and the construction of many miles of road would be necessary to reach them.

GYPSUM DEPOSITS OF THE LARAMIE DISTRICT, WYOMING.

By C. E. SIEBENTHAL.

Introduction.—The gypsum deposits of the district are of two varieties—earthy gypsum or gypsite, and rock gypsum. The mill of the Consolidated Plaster Company, at Red Buttes, making both plaster of Paris and cement plaster, uses rock gypsum with a smaller amount of gypsite, while the plant of the Acme Cement Plaster Company, near Laramie, works the gypsite exclusively.

OCCURRENCES OF ROCK GYPSUM.

Red Mountain.—The heaviest developments of gypsum rock in the district are found along the foot of the north slope of Red Mountain, in the extreme southwest corner of the Laramie quadrangle, in T. 12 N., R. 76 W., just north of the Wyoming-Colorado line. The gypsum measures first appear from beneath the Tertiary near the middle of the west side of sec. 7 and, winding in and out around the foothills of Red Mountain, take in the main an east-west line through secs. 8, 9, and 10, pass out at the northeast corner of the latter, bend to the north, swing sharply westward through the middle of sec. 3, and turn northward again near the middle of sec. 4, the gypsum here becoming too thin to be of importance. The base of the gypsum beds throughout this region is marked by a bed of limestone a foot or more in thickness, which is nearly everywhere crowded with fossils, mostly, however, individuals of a few species. These have been determined to be of Upper Carboniferous age. A section of the gypsum measures, showing the maximum development in this vicinity, is as follows, taken from the top of the beds on the north foot of Red Mountain, in sec. 9, down to the fossil bed.

Section of gypsum measures at the base of Red Mountain, on the north side.

	Feet.
Red gypsum rock, nearly pure	6
Red shale	35
Gypsum	3
Red shale	10
Gypsum	4
Reddish shale	55
Banded gypsiferous rock (limestone)	5
Red sandy shale	88
Gypsum, massive	67
Fossiliferous limestone	1
	274

The heavy gypsum bed, ranging in thickness from 30 to 60 feet, extends nearly the whole length of the outcrop outlined above. The distance to Red Buttes, the nearest point on the railway, is about 25 miles.

Sportsman Lake.—A mile east of this lake, near the middle of the north side of sec. 7, T. 13 N., R. 73 W., there is an outcrop of gypsum. A small test pit sunk at this point developed 4 or 5 feet of pure rock gypsum, but whether this is the full thickness of the bed is not known. A curly, laminated, gypsiferous limestone crops out a quarter of a mile east of the gypsum and dips beneath it. This limestone is traceable as a slight ridge, east of north, to and beyond Forelle, passing a quarter of a mile east of Red Buttes station.

Red Buttes.—A mile south of Red Buttes station and a quarter of a mile east of the limestone ridge just described is a deposit of gypsum which has been worked by the Consoli-

dated Plaster Company since 1890. These beds dip beneath the limestone and are therefore lower than the gypsum at Sportsman Lake. The quarry at present worked lies just east of the mill and shows a face of 15 feet of solid gypsum rock, which will be increased to probably 20 feet with farther progress into the hill. The quarry formerly worked lies northwest of the mill and shows a face of 8 or 10 feet. The dip of this bed would carry it 25 or 30 feet above the quarry now worked, showing the existence of two beds at this point. The upper bed was struck again near the point where the switch to the mill leaves the main line, but north or south of these occurrences the gypsum seems to thin out and disappear. An analysis of the gypsum from the quarry at the mill is as follows:

Analysis of gypsum from Red Buttes, Wyo.

[By D. O'Brine, Colorado Agricultural College.]

CaO	32.5
Al_2O_3	.3
Fe_2O_3	Trace.
SiO_2	.2
SO_3	46.3
H_2O	20.8
	100.1

Laramie and vicinity.—Gypsum is struck in the deep borings in Laramie at a depth of about 600 feet, but does not seem to be present at the outcrop of its horizon directly east of the city.

Five miles northeast of Laramie, in the SW. ¼ sec. 2, T. 16 N., R. 73 W., gypsum crops out at the north base of the small hill which enters near the middle of the south side of the section. Several test pits show a thickness of 9 or 10 feet of gypsum of an excellent quality.

OCCURRENCES OF GYPSITE.

Several valuable deposits of gypsum earth, or gypsite, resulting from the disintegration and transportation of rock gypsum, are found in the Laramie quadrangle. Some of these have been carefully bored and tested by parties interested in their location, while others have been located by their effect on the vegetation growing over them.

Laramie.—One of the chief deposits of gypsite is the one worked by the Acme Cement Plaster Company, just south of the city of Laramie. The deposit covers almost the whole of sec. 4 and has a depth of 9 feet where worked. The gypsite is in a finely divided state and goes directly to the calcining kettles without grinding or screening. The accidental impurities of deposition, such as sand, clay, and limestone, comprise about one-fifth of the whole, but do not interfere with its use for cement plaster. No plaster of Paris is made at this mill.

Other smaller deposits in the vicinity of Laramie are southeast of the fair grounds, across Spring Creek, and a mile northeast of Laramie, in the SE. ¼ sec. 28, T. 16 N., R. 73 W.

Other deposits.—Another larger deposit owned by the Acme Cement Plaster Company occupies almost all of sec. 4, T. 16 N., R. 73 W., lying east of the county road and overlapping the western part of sec. 3.

A deposit lies along Soldier Creek for 1 mile below and 2 miles above the site of old Fort Saunders.

A small deposit occurs in the valley of Harney Creek in the NE. ¼ sec. 21, T. 14 N., R. 73 W., a mile southeast of Red Buttes.

Another small deposit at Red Buttes, lying just west of the mill and having a depth of 5 or 6 feet, is worked by the Consolidated Plaster Company. Selected rock gypsum is used in the manufacture of plaster of Paris. The rejected rock is mixed with gypsite to make cement plaster.

An extensive bed of gypsite occupies the lower 2 miles of the valley of Willow Creek to its junction with Lone Tree Creek and extends 2 miles below the junction.

Another gypsite deposit occupies portions of secs. 33 and 34, T. 14 N., R. 74 W.

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