

THE "TRENTON" NEAR MORRIS, ILLINOIS

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Eight miles north of Morris, Illinois, in the north limits of the village of Central, SW. $\frac{1}{4}$ Sec. 28, T. 35 N., R. 7 E., a quarry exposes rock of Trenton age. Culver¹ has briefly described this location in his report on the Morris Quadrangle. The Galena rock in the quarry is of particular interest because it is one of the few places in northeastern Illinois where relationship between the Kimmswick of Missouri and the Galena of Wisconsin and Illinois may be studied. The quarry is located on a gentle rise on a rather flat till plain. Three to five feet of till covers the rock, the upper surface of which has been polished and striated by glacial action. The striae strike S. 55° W.

Apparently this area of Trenton rock represents an erosion remnant which has been planed off by glacial action. However, the fact that the Maquoketa contact is five and one-half miles east, and Pennsylvanian rocks overlap beds of Trenton age one and one-half miles south and west indicates the possibility that the quarry is on a minor fold extending from the LaSalle anticline. Payne² has studied the subsurface conditions west of Central and found evidence of faulting near Sandwich and Millbrook, Illinois. His studies disclose a number of minor structures associated with the LaSalle anticline, and one of these may be represented near Central.

Mottling.—The middle and lower beds of the quarry have a peculiar and striking mottled appearance. The main mass of the rock is light gray, but the mottles stand out as darker grays and browns. The mottling is not a surface staining; darker areas penetrate the rock in an irregular pattern.

The quarry walls in the mottled horizons were tested in many places with a 50% concentrated solution of hydrochloric acid. The light colored portions of the rock effervesce as a relatively pure limestone, while the stained areas react more slowly. Samples of the light and

dark colored rock show the following analysis:

	% light	% dark
SiO ₂97	3.16
CaO	53.77	38.93
MgO	2.46	14.23
R ₂ O ₃ (Al, Fe, Mn)45	.97
CO ₂	39.50	42.27
Alkalies + Ba	2.86	2.48

The analysis shows that the mottled areas are dolomitic, and that they contain more insoluble material. The irregular pattern of the markings, and thinning or fading of many of the mottles at their outer surfaces strongly suggest that the uneven dolomitization is caused either by the secondary infiltration of minerals, or, more probably, by the leaching out of those originally there.

In attempting to explain the peculiar dolomitization, the writer has considered the following: Evidence of solution is prevalent in the quarry rock. Vugs of varying size, stylolites, large cavities along joint planes, slump of beds, and insolubles remaining in the rock in the form of blue clay and shaly clay-like films are common. The light colored areas are less dense and not as hard as the mottled portions. The porosity of the light-colored rock suggests that leaching accounts for the partial disintegration.

The original rock was probably a slightly dolomitic limestone. Solution either by sea water or ground water leached the rock. Since descending ground waters are known to have a high calcium-magnesium ratio, the leaching probably took place after the sediment were uplifted. The percolating water increased the relative amount of silica in the rock, and, by removing calcium, increased the relative percentage of magnesium. At the same time, the total volume of the rock was reduced. Thus considerable calcium has been carried away, leaving the insolubles as clay-like films in irregular pattern throughout the rock, and dolomitic mottles as evidence of remaining partial dolomitization. It is realized that this view is the reverse

¹ Culver, H. E., Geology and mineral resources of the Morris Quadrangle: Illinois Geol. Surv. Bull. 43, pp. 115, 116, 1923.

² Payne, J. N., Subsurface geology of the Marseilles, Ottawa, and Streator quadrangle and vicinity; Ph.D. Thesis, Univ. Chicago, 1938.

of accepted theories of dolomitization, but the close association of solution and mottling lend support to this belief.

The writer has observed rocks of similar mottling at Dubuque, Iowa, Dixon and Belvidere, Illinois, Ft. Atkinson, Wisconsin, and Groos, Upper Michigan. The markings, however, are much less distinct, and are commonly deeper buff than the surrounding rock. At the above locations solution is not nearly so much in evidence, which fact may account for the less distinct marking of the rock.

Lithology.—The quarry may be divided roughly into two zones lithologically. (1) An upper, consisting of ten feet of platy, medium to coarsely crystalline limestone. Shales are not common. The color of the rock in this zone is light gray on a freshly fractured surface with a slight pinkish cast where the rock is more coarsely crystalline, but the weathered rock is buff. Red films often cover the fossil molds. Secondary calcite is plentiful in the strata and along the joints. Calcite vugs and pyrite are quite common. Small amounts of oil have been

found at this horizon in the area south of Plainfield about 15 miles northeast of Central. The porosity of the rock in this zone makes it a possible reservoir for oil. (2) The lower 20 feet is a gray, dense, dolomitic limestone in which upper beds contain several well defined crystalline bands. The bands have an uneven surface at the base, are coarsely crystalline, and very fossiliferous. Many of the fossil fragments appear to have been macerated. The bands, ranging from two to four inches in thickness, grade into bands more finely crystalline above and change gradually upward to fine grained nearly lithographic limestone. Zone five of the measured section shows a one inch band of fine grained rock both above and below one of these bands.

In the lower division, thin shaly partings separate the massive beds. Also thin shaly films, referred to above (see mottling) are found without any definite pattern throughout the rock. These films, when exposed on a fresh fracture are dark gray, dark brown, or black. The rock gives off a fetid odor under the blow of a hammer.

CENTRAL QUARRY, SW. $\frac{1}{4}$ SEC. 28, T. 35 N., R. 7 E., MORRIS QUADRANGLE,
ILLINOIS

	Feet	Inches
10. Limestone, slabby, thin-bedded, gray, weathers buff; bedding surfaces uneven; iron stained in places, calcite vugs; very fossiliferous with <i>strophomena</i> profuse, <i>Illaeus</i> and <i>Isotelus</i>	7	3
9b. Limestone, dark gray, pyritic, fossiliferous; beds three inches thick; more crystalline than No. 10.....	1	
9a. Limestone, gray, thin-bedded, slabby, pyritic; calcite vugs.....	1	10
8d. Limestone, gray, dense, fossiliferous; calcite vugs; crystalline band through center which is more coarsely crystalline below than above....		7
8c. Limestone, gray, fossiliferous, in two thin beds.....		7
8b. Limestone, very fossiliferous, near coquina; weathers buff.....		2
8a. Limestone, dolomitic, gray to dark gray, beds three to four inches thick; bedding surfaces uneven with carbonaceous films between the beds; prominent shaly parting at base; mottling of dark and light gray colors noticeable, but not prominent; dwarfed species of <i>Receptaculites</i> near the top.....	1	3
7b. Limestone, dolomitic, gray, mottled, brittle; more massive than 8a.....	1	6
7a. Shale, calcareous, dark gray, somewhat crystalline, carbonaceous; wavy laminated bedding, persistent as a marker; <i>Hormotoma</i> noted.....		2
6c. Limestone, dolomitic, gray, mottled, fossiliferous.....		7
6b. Limestone, dolomitic, similar to 6c but contains a gray-brown crystalline band which is coarse below grading to sublithographic limestone upward; base of the crystalline band is uneven.....		5
6a. Limestone, dolomitic, gray, brittle, fossiliferous, in a massive bed.....	1	
5. Limestone, dolomitic, gray, brittle, mottled, carbonaceous, massive; near lithographic at top and bottom of this unit.....	1	6
4. Limestone, dolomitic, similar to No. 5 except that top for six inches is very crystalline; mottling pronounced.....	1	7
3b. Limestone, dolomitic, gray, dense, massive, mottled.....		10
3a. Limestone, dolomitic, similar to 3b; carbonaceous films on uneven and pitted bedding planes.....	3	
2. Limestone, dolomitic, gray, dense, massive, somewhat mottled.....	1	
1. Limestone, dolomitic, similar to No. 2; sparingly fossiliferous. <i>Hormotoma</i> and <i>Trochonema</i> present.....	7	6

Comparison with the Kimmswick limestone.

The Kimmswick of Missouri and western Illinois is a medium to massively-bedded, gray, crystalline, fossiliferous limestone. It is characterized by its lithologic uniformity. The rock at Central exhibits the following characteristics, which shows transitional relationships:

- (1) A number of coarsely crystalline bands in the quarry section.
- (2) The calcareous and not wholly dolomitic nature of the rock.
- (3) Gray color with a pinkish tone in the upper beds.
- (4) A fauna which compares closely.