LIMESTONE ON DAMON MOUND, BRAZORIA COUNTY, TEXAS

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Separate from The University of Texas Publication 4301, pp. 265–269

Issued November, 1946

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The Coastal Plain of Texas is a large, fairly thickly populated area. Within its boundaries are many important industries which use large quantities of minerals and rocks, not the least important of which is limestone. However, limestones are relatively rare in the Coastal Plain. This rarity is due to the particular conditions of sedimentation which existed during the time of deposition of the Coastal Plain sediments. Limestones that are used in this area must be shipped long distances from sources in the north or west.

In the Coast Prairie portion of the Coastal Plain, limestones are very rare. Those that are present in the geologic section lie beneath thousands of feet of sediments. However, the cap rock of the salt domes of this area characteristically contains a limestone or calcitic component. Most salt domes lie too far beneath the surface for their limestone cap to be exploited. However, on the Damon Mound salt dome a limestone, probably the cap rock, comes to the surface.

LOCATION

The Damon Mound is located in the northwestern portion of Brazoria County on the south side of State highway No. 36 near the Fort Bend County line. The mound, which was created as a result of the upward movement of the underlying salt plug, is quite conspicuous in the flat, featureless, low-lying prairie country of the Gulf Coast. The location of Damon Mound in the Gulf Coastal Plain area is indicated on Plate I.

On account of its prominence in the flat Coast Prairie the mound was well known to the early settlers of Texas. The first published account of Damon's Mound is found in the newspaper Telegraph and Texas Register, vol. 2, no. 27, July 22, 1837, published in Houston, Texas. There under the heading "Geography of Texas. Brazoria County. Natural Curiosities.—" the following item is given by an anonymous local resident:

> Near the northern boundary of this county twelve miles above Columbia is a singular swelling of land about 100 feet high, and a mile or a mile and a half in circumference, forming a long regularly oval knoll, which attracts the notice of every traveller, as it is the only eminence which breaks the uniform level of the surrounding country to the extent of forty or fifty miles on either side. Its singular form and situation have obtained for it the distinctive title of "The Mound." There are two similar but smaller hillocks in the county, one about midway between Austin's and Chocolate bayous, near the bay; the other nearly midway between the Brazos and Bernard, near the coast; the summit of the latter is decorated with several Muskit trees, which are probably the only trees of this kind in the whole county.

GEOLOGY AND ORIGIN

The surface formation on and around Damon Mound is clay of Beaumont age. Bevier[1] reports that some gravel, probably Lissie in age, is present on the eastern side of the mound.

Fundamentally, the subsurface geology consists of sediments from Jackson through Fleming in age, which are dipping very steeply off the salt dome, and Pliocene and Pleistocene sediments, which overlie the cap rock. The formations mentioned are only those penetrated by the drill. However, at one place on the mound limestone is exposed in a small quarry (see fig. 67). This limestone has been mentioned in the literature. One reference states: "At Damon Mound the *Heterostegina* lime is found at the surface. This is the oldest known bed exposed on the Coast and shows an uplift of 6000 feet."[2] Another Yearbook of the National Oil Scouts Association of America mentions the fact that the cap rock of the dome is exposed at the surface.[3]

Since there seemed to be two opinions on the matter, and the object of controversy being easily accessible for study, the locality was visited, and samples were

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[1]Bevier, G. M., The Damon Mound oil field, Texas: Bull. Amer. Assoc. Petr. Geol., vol. 9, p. 521, 1925.

[2]National Oil Scouts Association of America, Yearbook, p. 185, 1935.

[3]*Idem*, p. 77, 1936.

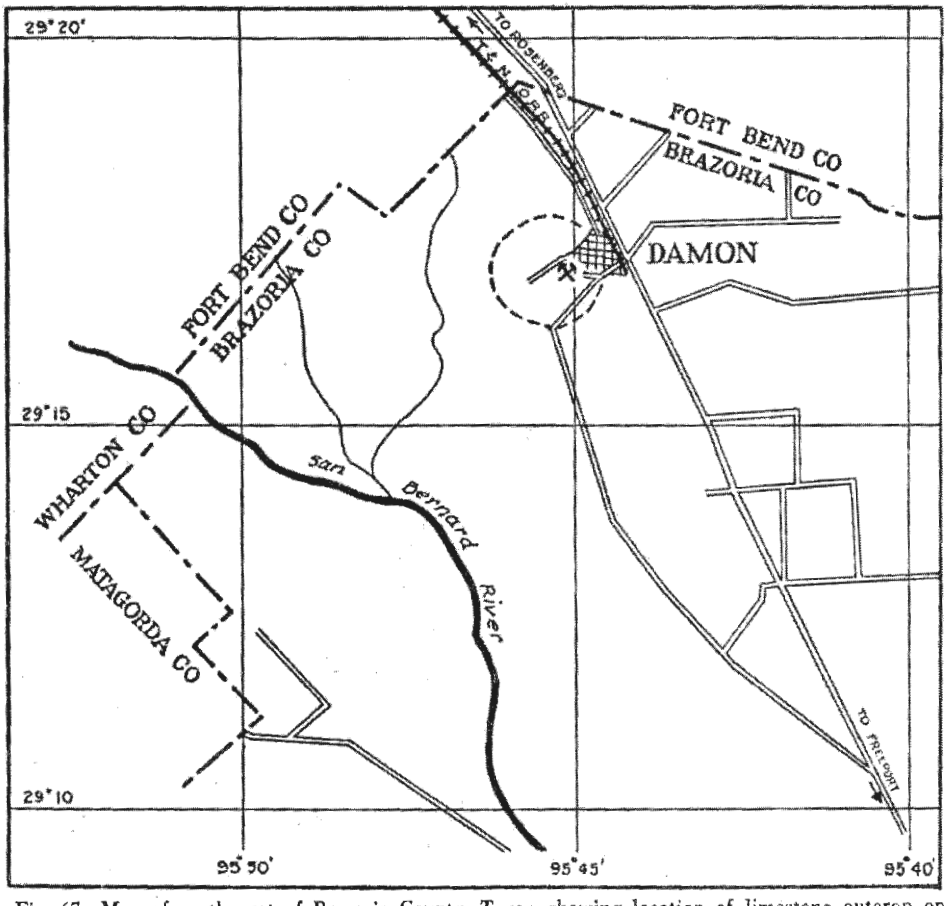

Fig. 67. Map of north part of Brazoria County, Texas, showing location of limestone outcrop on Damon Mound salt dome (outlined by broken line circle).

taken. The samples were taken from holes in the bottom of a shallow, abandoned quarry at a road turn approximately 0.3 mile south of the school in the town of Damon. In addition to the rock samples, five samples of sandy clay were taken from auger holes near the edge of the quarry. These were washed and examined but contained no fossils. From every indication the rock appears to be cap rock and not *Heterostegina* limestone. Whatever it is is inconsequential for economic purposes; the fact remains that a producible limestone is locally available on the surface in an area where such rock is scarce.

DESCRIPTION

The rock is a hard, compact, rust-colored, fine-grained limestone with many veins and druses of cloudy calcite. Some of the veins and pockets have not been completely filled, giving the rock a warty, irregular appearance. A crusty covering of travertine or caliche-like material forms the outer portion of the rock. This feature may not be present at depth.

Under the microscope, the limestone consists of fine-grained, interlocking calcite crystals with masses of iron-stained, finer-grained calcite crystals dispersed throughout. Fine specks of limonite and magnetite or ilmenite are present. Quartz crystals are scattered randomly through the matrix in varying amounts.

CHEMICAL ANALYSIS

The following chemical analysis of the limestone was made by R. M. Wheeler of the Bureau of Economic Geology.

Chemical analysis of Damon Mound cap rock.

	Per cent
Ignition loss	38.34
SiO_2	7.34
Fe_2O_3	0.51
Al_2O_3	2.83
CaO	48.22
MgO	0.27

The percentage of silica, SiO_2, shown above is high for limestones but is to be expected on account of the arenaceous residue and the quartz crystals in the thin sections. Certain elements were known to be present in some of the detrital grains, for example, titanium in rutile, but did not show up in the chemical analysis because of the very small amounts. All of these are probably grouped in with Fe_2O_3.

INSOLUBLE RESIDUE

An insoluble residue of the limestone was prepared. The procedure was as follows: first, the limestone was crushed to particles not exceeding 3 centimeters in length and 1 centimeter in width and breadth, the average size being approximately 1.5 to 2.0 centimeters. Pieces were selected which seemed to be representative of the cap rock itself and not the secondary caliche-like material. These selected pieces were weighed, placed in a beaker, and covered with 3 per cent solution of C. P. hydrochloric acid. At intervals, after chemical action had ceased for that amount of acid, this was decanted and a new portion added. After all the particles had been digested, the residue was washed, dried, weighed, then wetted again and separated into a clayey portion and an arenaceous portion. The total residue comprised 20.6 per cent by weight of the sample. In volume the arenaceous portion approximately equals the clayey portion times a factor of 2. The clayey portion of the insoluble residue is a yellow-brown, uniform clay, while the arenaceous portion falls into the classification of a very fine sand according to Wentworth's modified Udden scale. It is composed primarily of quartz crystals less than 0.1 millimeter; however, there are a few larger grains present. Heavy minerals are present also.

A microscopic size analysis of the sand was made and plotted on a graph. The procedure of the microscopic size analysis is that outlined by Krumbein and Pettijohn.[4]

The larger percentage of grains have an intermediate diameter of 64.8 microns or 0.0648 millimeter, which barely falls within the very fine sand grade of the Wentworth scale; however, the average size of the grains, obtained by totaling the intermediate diameters of all the grains and dividing by the number totaled, is 87.7 microns, which lies well within the grade. See figure 68.

A specific gravity separation was performed on the arenaceous portion with the use of bromoform (specific gravity 2.8). The heavies were mounted on slides, mineral species were identified, and the percentages were plotted on a graph. The heavy residue consists mainly of white and black opaque minerals, tourmaline, and zircon. Rutile, pyrite, and green hornblende are present in minor amounts. The black opaque minerals are probably magnetite or ilmenite or both. It is difficult, if not impossible in many cases, to differentiate between these two in detrital grains. The white opaque minerals could not be identified with satisfaction; however, leucoxene may be present in the group. It does not appear to be leucoxene in its typical state. Should this be leucoxene, it would be a strong point in favor of ilmenite for some of the black opaques, since leucoxene is an alteration product of titanium-bearing minerals such as ilmenite and titanite. See figure 69.

The light fraction of the separation contained euhedral quartz crystals which may be parts of the quartz "rosettes" of Brown.[5]

USES

The Damon Mound cap rock has been used as a building stone, for it was the necessity for such a material that led to its being quarried. The original quarry is quite shallow and filled with soil washed in from the surrounding area. Records state that the quarry was abandoned because of water encroachment. It seems reasonable to suppose, since the quarry is on the side of the mound, that any

[4]Krumbein, W. C., and Pettijohn, F. J., Manual of Sedimentary Petrography, pp. 126–129, 176–178, and 362, D. Appleton-Century Company, New York, 1938.

[5]Brown, L. S., Cap-rock petrography; Bull. Amer. Assoc. Petr. Geol., vol. 15, p. 514, 1931.

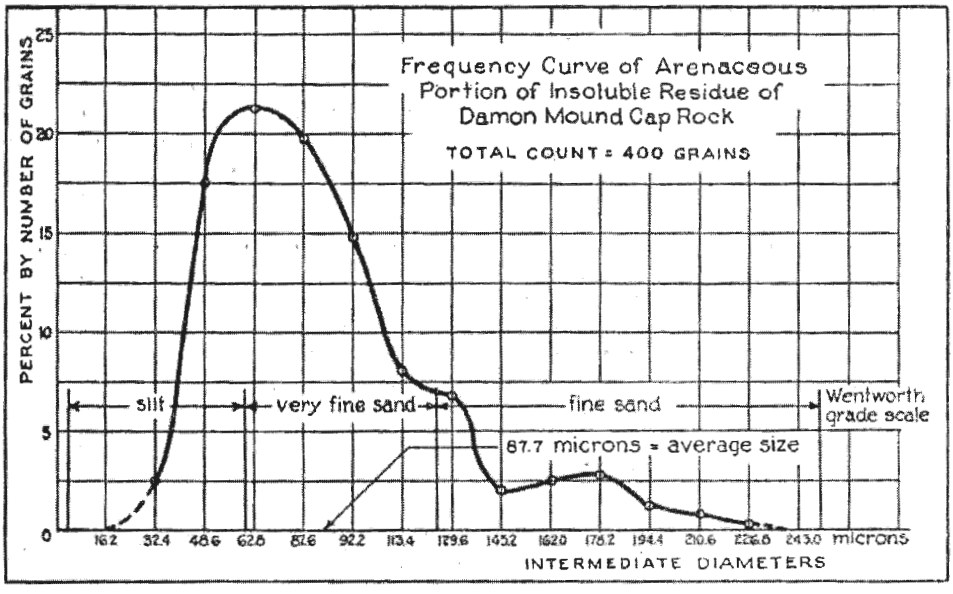

Fig. 68. Frequency curve of arenaceous portion of insoluble residue of Damon Mound cap rock.

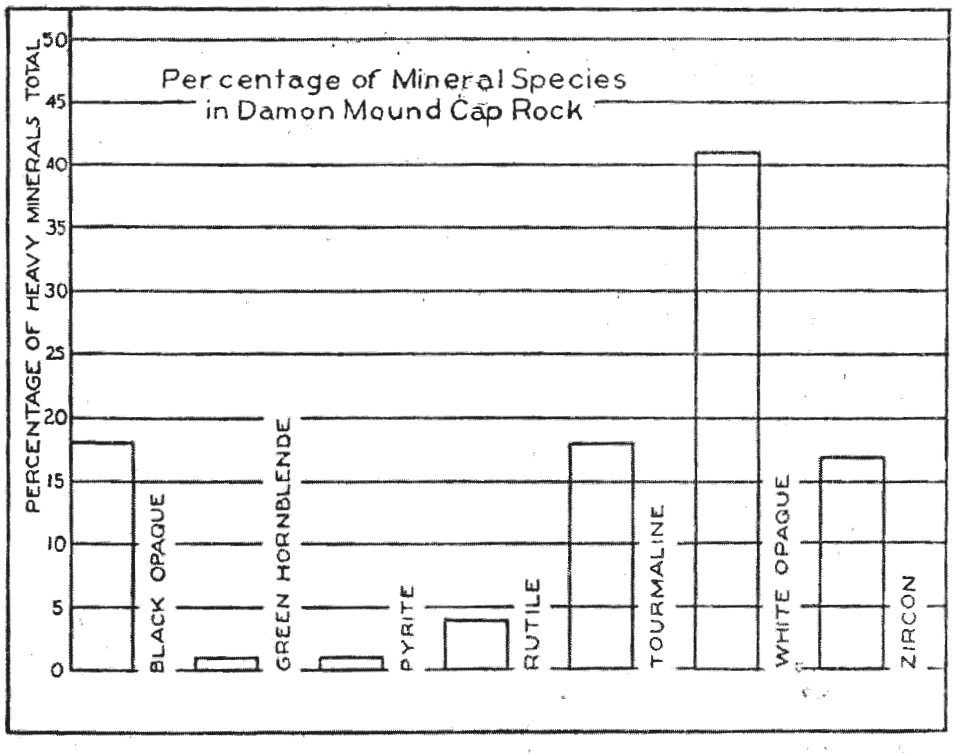

Fig. 69. Percentage of mineral species in Damon Mound cap rock.

water admitted to the soil cover and porous country rock during rains would be conducted down the side of the hill and out into the prairie. Such a condition should keep the quarry free from water; however, a drain conceivably could be constructed to accelerate drainage immediately following rains.

Since the surface formation of that portion of the Gulf Coast is composed of clay, country roads become almost impassable during rainy weather. That portion of the Gulf Coast is very humid, and rains are fairly frequent. Road metal to top the clay base of these roads is very desirable in this area.

Because of the low prices that crushed stone of this nature brings, the market necessarily must be near by, and transportation must be relatively short. Such a deposit could hope to service only a small area so as to keep within the limits of profit; however, since this deposit is unique, there is a possibility that the radius of consumption could be extended farther than usual and still remain on a profit basis.

Riprap is another possible use for this stone. Riprap is a material consisting of irregular heavy particles of stone usually used as a protection against erosion; for example, breakwaters, spillways of dams, and fills across swampy land.

Since the stone has been used for building purposes in the past, there is no reason why it can not be used again, at least in the local area and in the form of rough untrimmed stone.

Should anyone care to investigate the possibilities of opening this deposit, the writer suggests that the water problem be considered first, because it is the primary unknown factor that could prohibit the profitable exploitation and use of this rock.

ACKNOWLEDGMENT

This paper was prepared on suggestion and under the guidance of H. B. Stenzel, Geologist, Bureau of Economic Geology.