

**NEWLY EXPOSED
GEOLOGIC FEATURES
WITHIN THE OLD
"8000 ACRE GRANT"**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649193677

Newly exposed geologic features within the old "8000 acre grant" by George Sheldon & J. M. Arms Sheldon

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Edited by Trieste Publishing Pty Ltd.
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GEORGE SHELDON & J. M. ARMS SHELDON

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BY

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Recent excavations have brought to light interesting geologic features within the boundaries of the old "8000 acre Grant," given to Dedham by the General Court in 1665—the nucleus of the town of Deerfield, Massachusetts.

At Wapping Long Hill, about two miles south of Old Deerfield Street, on the west side of the road to Bloody Brook the scene of the Lothrop massacre, a section of a

sidehill was exposed in the summer of 1902 where formations were seen of unique structure and most striking aspect. The exact location was a few rods east of the deep clay cutting of the Canal Railroad, south of Wapping village, and a few feet below the rails. In the illustration (pl. I,* looking westward) the sky line with telegraph poles is the top of the west scarp of this cutting. The new exposure is in the middle ground. This is about 150 feet long and from 16 to 26 feet deep. Nearly one half of the new section is not seen, being in a pit below the level where a man is seen sitting under a tree. What appears to be two low hills just above is the line of the east scarp of the railroad cutting, here broken through by a rain-made gulch, now partly filled with débris.

The upper part of this section is soft, stratified clay from three to ten feet in thickness. This clay rests unconformably upon a formation of variously colored sand. At the left of the seated figure the sand rises like a dome, and dips away to the north and south. The line of demarcation between the clay and sand has never been disturbed, and is remarkably well defined. On the south side (pl II, view from the east) this line is emphasized by the soft clay that has run down upon the sand and turned white in drying, making irregular white streaks (pls. I, II). The sand has been excavated 26 feet from the surface but its depth is unknown.

Generally speaking, the south part (pl. II) is a solid, perpendicular wall of sand and clay as left by the workmen.

*Pls. I—VI, VIII—XII are from photographs taken under the direction of the authors by Frances S. and Mary E. Allen of Deerfield. Pl. VII is from a painting made expressly for this paper by Augustus Vincent Tack, of Deerfield and New York.

The sand is finely stratified, and the sand of the dome is of a peculiar pink shade. This pink sand is entirely free from iron rust or limonite, and other impurities; it is as clean as any beach sand, and will not soil the daintiest linen. The face of the sand has lost its moisture, and when touched by the trowel the sand flows almost as freely as water. Under the magnifying glass this sand is seen to consist of fragments of crystalline rocks like granite. Grains of glassy, white and pink or red quartz greatly predominate, but scattered through the mass are tiny scales of white mica, with bits of slate and mica schist.

The most remarkable feature of the exhibit is at the apex of the sand dome, where the pink color is most pronounced. As left by the shoveler the bank was vertical, with three feet of dark clay at the top, the sand disappearing below in the pit. The cunning hand of Nature has since worn away some of the sand, leaving the upper segment of the clay-arch a projecting and protecting cap. As the surface dried at this point the sand crumbled off or was blown away by the wind, and here is the marvel! The upper part of the sand dome exhibits a beautiful columnar structure (pl. II) exposed on three sides, and so noticeable was it that one of our party exclaimed at sight—"Look at the Giant's Causeway!" And there it was—perpendicular columns of sand rising one tier above another, clear, sharp and distinct; some broken off at the middle, others nearly reaching the overhanging cap of clay. The day after this discovery was made photographs were taken. The following day a heavy storm of wind and rain swept away the wonderful columnar pile and the protecting cap of clay. Will the like of this ever again be seen! Can any one tell what agency pro-

duced this remarkable structure in the midst of the dome, and held the friable sand in position while the outlines of the columns were being exposed by the delicate manipulations of the wind? This formation could never have been carved by the hand of man. The least touch set the sand aflowing, and the angles instantly melted away. Was it that mysterious force of Nature, hidden away in the earth, which is constantly striving to bring order and beauty out of the shapeless mass, and which is revealed in crystalline forms? This may be, but there are other forces to be considered farther on as a probable, or, at least, a possible cause.

At the centre of pl. I, and north of the pink dome, the earth has not been disturbed by the shovel. In marked contrast with the pink sand, and separating it from the brown sand to the north, is a layer of coarse, ochre-yellow sand, colored by oxide of iron, and apparently dipping under the pink sand southward. From this point the ochre-yellow layer rises northward, and is seen underlying the clay across the whole extent of the north half of the exposure. At various points on the line of juncture the yellow sand and the clay are mixed and kneaded together in compact masses. Under this ochre sand lies in gently disturbed layers, a mass of fine, brownish sand, very different in composition and color from the pink sand, the lowest development being an undisturbed coarse, red sand. At the extreme north of the section, and only seen in a pit below the present level, another rounded mass of the pink sand is exposed, overlaid with the brown and the ochre-yellow sand and the upper clay before described.

So far as we can learn from geologists this pink sand, or something similar, occurs in only one other place in the

Connecticut Valley. In a cutting of the Canal Railroad, near Laurel Park, in Northampton, Professor B. K. Emerson found and described a mass of what he terms "peach blow" sand. He calls this part of "a true sea beach of great extent," and says "it is older and unlike anything else in the Valley."^{*}

In comparing samples of the pink sand at Long Hill with samples of the "peach blow" sand from the Laurel Park cutting, we find that the two are similar in structure, the chief differences being that the pink sand is finer and contains a larger proportion of red quartz and of slate and schist.

About ten rods east of the sand formation just described and on the east side of the highway which has been recently widened, quite a large face of the scarp has been exposed. And here is another extraordinary exhibition seeking explanation. This formation is chiefly Champlain clay, and the dark, tenacious layers alternate with those of a lighter hue and more friable structure. This friability is due to the "quartz flour" contained in these lighter layers, which is so fine that the "gritty feel" cannot be detected by the fingers, but only by the teeth.

Here we see (pls. III, IV) the upper part of the clay exposure lying in horizontal, undisturbed strata. This is clearly a later deposit. Below, the strata are crowded and contorted (pls. III—V); plainly this was the effect of some powerful force exerted from the north. Towards the south end of the bank, seen in pl. VI, the strata show less and less

^{*} U. S. Geol. Surv. Monog. XXIX, Geology of Old Hampshire County, Mass., p. 696.