
THE THICKNESS OF THE COLUMBUS LIMESTONE.

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So far as is known there is no exposure of the total thickness of the Columbus limestone. On account of its lithological similarity to the Monroe limestone below, the two are not usually separated in well records so that exact determinations from this source have been hard to get.* In the fall of 1900, however, the city of Columbus, in connection with a proposed storage dam in the Scioto River, drilled several wells into the rock to test its ability to withstand hydraulic pressure. Most of these were at such high levels on the bank that they did not penetrate to the Monroe. Two, however, Nos. 9 and 10, were drilled from near the surface of the river and passed several feet below the base of the Columbus. No. 10 was located on the west bank, which is steep at that point. It was thought that by taking the section of this well and that of the bank the whole thickness of the Columbus could be obtained. The well was not driven in the ordinary manner, where the rock is broken into bits by a heavy drill and so mixed that the precise determination of any level is impossible, but a solid core was taken out, which broke only at the bedding planes and weak places. This core, together with a very complete record, are preserved in the City Engineer's office. It allows the determination of the line between the two formations to a fraction of an inch and the measurements throughout are much more accurate in the boring than those of the bank, which were taken with a Locke level, and so not susceptible of great accuracy.

The rock in the bank above is mostly covered, but fortunately a small quarry has been opened at the top of the hill which shows the top of the smooth layer. The quarry does not extend up to

* The well in the State House yard at Columbus, as interpreted by Newberry, shows a thickness of 138 feet for the Corniferous, which includes both Columbus and Sandusky formations. The upper component is shown to have a thickness of about 30 feet by numerous exposures in Franklin and Delaware Counties. Deducting this leaves a thickness of 108 feet for the Columbus. Unfortunately, however, the record of this well has been found to be unreliable in some particulars and so is of scant authority in this case.

the bone bed or top of the formation. As the quarry is at about the top of the hill it is probable that this bed has been carried away for some feet back from the brow of the bluff into the field. It might be wished that this layer were present to give a more certain determination, but as the interval between the smooth layer and the bone bed is fairly constant the presence of the latter is not so important as would appear at first.

The sections of the hill and well are given in the tables. It will be seen that the total thickness of the Columbus exposed is 109 feet. Assuming an interval between the bone bed and smooth bed of 9 feet (an inch or two less than that shown in the quarries a mile and a half below the dam site), we would have a thickness for the formation of 110 feet, thus checking to within 2 feet of the determination from the State House yard well.

SECTION OF BANK.	Feet.	In.	TOTAL	
			Feet.	In.
To bone bed (not exposed).....	? 1	2	126	2?
Top of quarry, no sign of bone bed.....	..	..	125	..
Upper Columbus exposed in quarry.....	8	..	..	..
Smooth layer.....	..	..	117	..
Quarry extends a few inches below smooth layer.....	..	..	..	..
Mostly covered, occasional ledges exposed to river level	64	..	53	..
SECTION OF WELL.				
Gravel and soil.....	2	..	55	..
River level.....	..	..	53	..
Gravel and soil to top of rock.....	2	7	53	..
Heavy bedded some layers come out more than 2 feet thick.....	24	8	50	5
Thin bedded much waste in core.....	7	2	25	9
Heavy porous breccia, base of Columbus.....	2	4	18	7
Hard course with dark bands top of Monroe.....	..	8	16	3
Mostly thin bedded, dark.....	3	10	15	7
Purer limestone.....	..	9	11	9
Dark thin bedded resisting acid.....	1	..	11	..
White, purer stone.....	..	9	10	..
Heavy bedded.....	1	9	9	3
Dark, very hard resisting acid.....	..	6	7	6
Hard, heavy, dark stone with little waste.....	7	..	7	..

The determination is subject to the following sources of error: 1, waste in the core of the well which would have the effect of making the base of the Columbus too high with a maximum value of 2 inches; 2, a variation in the level of the water between the time of boring the well and that of measuring the hill amounting to possibly 6 inches in the other direction; 3, errors in leveling amounting to possibly 3 feet either way; the city contour maps check the leveling and preclude the possibility of greater error, *i. e.*, the top of the quarry lies between two contour lines having a five foot interval; 4, variation in the interval between the smooth bed and bone bed with a probable maximum of 8 inches.

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