

THE ROCK SECTION AT THE O'SHAUGHNESSY DAM.

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For the purpose of securing additional water supply, the city of Columbus constructed during 1922 to 1925, a new dam on the Scioto river in the southwest corner of Delaware County about 15 miles northwest of Columbus. The excavations incident to the building of this dam exposed a section of rocks 90 feet thick which was studied from time to time by the writer.

The bed rock exposed along this portion of the Scioto valley is the Columbus limestone of middle Devonian age and the section that was exposed at the dam included the entire thickness of the Columbus and a few feet of the Delaware limestone above and of the Monroe dolomite below. The rocks exposed were correlated by zones with the standard section of the Columbus limestone for central Ohio as worked out by Dr. Clinton R. Stauffer and published in Bulletin 10 of the Geological Survey of Ohio.* The section as seen in the excavations during the building of the dam is given below:

	Thickness Feet
<i>Delaware Limestone</i> —	
Bluish limestone in layers of 3 to 6 inches.....	3+
<i>Columbus Limestone, 87 feet</i> —	
Zone H. Bluish gray, fossiliferous limestone in layers of 1 to 2 feet. The base is at a very smooth plane.....	7
Zone G. Bluish gray, fossiliferous limestone in layers of 3 to 5 feet....	19
Zone F. Bluish gray, very fossiliferous limestone with <i>Spirifer gregarius</i> (<i>Spirifer gregarius</i> zone).....	4
Zone E. Bluish gray limestone that weathers buff. In layers of 12 to 18 inches. Upper half fossiliferous.....	14
Zone D. Grayish brown limestone with bands of chert nodules and some chert layers (Chert zone). Contains a number of gastropods..	12½
Zone C. Missing.	
Zone B. Brown dolomitic limestone with some banding and in thick ledges of 3 to 5 feet. The basal 8 feet is more compact and contains some sand grains.....	30
Zone A. Arenaceous limestone matrix with pebbles of Monroe dolomite and chert. (Conglomerate zone).....	½
<i>Monroe Dolomite</i> —	
Ashen gray to drab, laminated argillaceous dolomite in beds of 2 to 8 inches. In part brecciated, with minute fragments.....	2+

* 1909; Geol. Surv. Ohio, Bull. 10, pp. 32-38.

In Figure 1 is shown a cross section of the Scioto valley at the O'Shaughnessy dam as one sees it looking up stream from the south toward the face of the dam. The section, which is drawn to scale, shows the altitude and width of the various rock benches just south of the dam and the location of the exposures of the several zones of the Columbus limestone with respect to these benches and the valley sides. The zonal contacts are 2 to 3 feet lower on the east side than on the west, due to the general eastward dip of the rocks of the region. The elevation of the bed rock in the bed of the river here was at about 775 feet above sea level and the rock formed the valley sides up to about 845 feet.

The excavation for the foundation of the dam, reached the Monroe dolomite at 13 feet beneath the rock floor of the valley at 763 feet A. T., and extended 2 feet into the Monroe. The nearest exposure of this formation is 7 miles north-northwest on Mill creek near Bellpoint. North of White Sulphur, Delaware County, the Scioto river flows on the Monroe, but the southward dip of the rocks of this region, being greater than the gradient of the river, carries this formation below the bed of the river. The rock which was exposed in the bottom of the excavation at the dam is quite characteristic of the Monroe farther north in Delaware County. No Monroe fossils were seen but this is not surprising since many much larger exposures of the Monroe do not show fossils. It belongs to the Lower Monroe, or Bass Island formation, of Silurian age.

Zone A of the Columbus limestone is represented by a layer of conglomerate about 6 inches thick. The pebbles are laminated dolomite and chert from the Monroe. The matrix contains many well-rounded sand grains and in fact the sand content of the layer is greater here than at any other known exposure of this zone in central Ohio. The conglomerate layer rests disconformably upon the Monroe and the sides of the trench showed a contact irregularity of a few inches cutting across the layers of the Monroe. The zone represents the earliest deposit of the Columbus time as the sea transgressed the eroded, pebble-strewn surface of the Monroe. The sand grains were either on the surface or washed in by the encroaching sea. Their characteristics are such as to show that they were derived from the Sylvania sandstone of northern Ohio, the horizon of which is at this Monroe-Columbus hiatus.

Zone B is present on the three lower benches on the west and on the lowest bench on the east. It is a brown, dolomitic limestone in thick ledges of 3 to 5 feet, and contains few fossils. Only the upper half is exposed now but in the excavations beneath the river bed, the entire zone with a thickness of 30 feet was shown. The basal 8 to 10 feet are more compact, bluer in color, and contain some sand grains throughout the limestone. This basal part passes into the typical brown limestone above and is considered simply a phase of the basal part of the zone, laid down while the pre-Columbus surface with its sand was not yet deeply buried.

Zone C of the standard section, characterized by an abundance of corals was not differentiated in this section although the exposure of the horizon was complete. At one place in the upper part of zone B, a chert lense yielded some small corals but it could hardly be called a coral zone.

Zone D, the chert or gastropod zone, is well represented by grayish brown limestone with bands of chert nodules and some chert layers. The greatest percent of chert and the largest number of gastropods were found at a few feet below the top. The limits of the zone are not very definite but it is most distinct on the west where it has a thickness of $12\frac{1}{2}$ feet which is greater than for any of the sections given by Stauffer. This thickness is sufficient to represent the combined thickness of zones D and C but there are no corals in the lower part of the zone.

Zone E with a thickness of 14 feet underlies on the east the three benches at elevations of 817, 812 and 807 feet and the 811 foot bench on the west. It is bluish gray limestone in thick layers and the upper half is quite fossiliferous with many specimens of the gastropods *Pleuronotus* and *Euryzone*.

The very fossiliferous limestone forming zone F underlies the 822 foot bench on the east side of the valley. It contains the characteristic fossil *Spirifer gregarius* which on some bedding planes is quite abundant. Aside from the presence of this fossil the 4 feet of limestone forming this zone might very well be included with Zone E.

Zone G underlies the highest bench on either side and is present in the outer walls of the valley. It is in thick ledges which break up to thinner beds on weathering. The top of the zone is marked by a smooth plane and this may be found at about 4 feet below the top of the rock exposure in the east wall

just south of the dam. This zone, as well as the other thick bedded zones, E and B, is broken by vertical and inclined joints.

Zone H forms the upper few feet of the rock wall on either side of the valley but the top of the zone is not reached.

Bluish limestone interpreted as Delaware limestone was taken from the bottom of a trench beneath the present roadway about 50 yards east of the east end of the dam. The elevation of this stone is only a few feet above the top of the exposure of Columbus limestone in the east bluff at the end of the dam but the contact of the two formations was not seen here. The bluish limestone that was exposed in this trench is like the basal Delaware as found in the quarries at the town of Delaware to the north and very different from the shaly basal zone of the Delaware as found along the Scioto river 10 miles south of the dam. On the west side of the valley about 100 yards northwest of the west end of the dam, in the head of a gully, 2 or 3 feet of the Delaware limestone are exposed above a stratum containing a few fish teeth, the "bone bed," which marks the top of the Columbus limestone. The Delaware stone here is similar to that taken from the trench east of the valley. Fragments of the "bone bed" were also taken from a trench beneath the present roadway less than 50 yards from the west end of the dam, the elevation of the contact here being at about 851 feet.

The data given above shows that the Delaware limestone which underlies the upland comes to within 50 yards of either end of the dam and the width of the Columbus limestone belt along the Scioto valley is here only one-fourth of a mile instead of one and one-half miles as shown on the maps of the Columbus quadrangle.* The elevation of the Columbus-Delaware contact is at about 850 feet, about 45 feet lower than on the maps noted above. This contact was also found in the large ravine from the east about one-half mile south of the dam and in the large ravine from the east about one-half mile north of the dam and in both places its elevation agrees with that found at the dam.

No attempt was made to make a complete collection of the fossils of the various zones of the Columbus limestone exposed at the dam. Such fossils as were collected are listed below and their distribution by zones shown.

* Geol. Surv. Ohio, Bull. 14, and U. S. Geol. Surv., Folio No. 197.

	ZONES					
	B	D	E	F	G	H
ANTHOZOA—						
<i>Aulacophyllum convergens</i> Hall.....			x			
<i>Cystiphyllum ohioensis</i> Nicholson.....						x
<i>Cystiphyllum vesiculosum</i> Goldfuss.....				x	x	
<i>Eridophyllum verneuilanum</i> (Edwards and Haime).....			x	x		
<i>Favosites emmonsii</i> Rominger.....			x			
<i>Favosites turbinatus</i> Billings.....			x	x	x	x
<i>Heliophyllum cornicula</i> Edwards and Haime.....				x	x	
<i>Zaphrentis gigantea</i> Rafinesque.....		x	x	x		x
<i>Zaphrentis prolifica</i> Billings.....			*	x	x	x
HYDROZOA—						
<i>Stromatopora ponderosa</i> Nicholson.....	x		x			
BRACHIOPODA—						
<i>Atrypa reticularis</i> (Linnaeus).....	x	x	x		x	x
<i>Atrypa spinosa</i> Hall.....			x	x	x	x
<i>Camarotoechia billingsi</i> Hall.....	x					
<i>Chonetes mucronatus</i> Hall.....				x	x	x
<i>Meristella nasuta</i> (Conrad).....		x				
<i>Productella spinulicosta</i> Hall.....				x		
<i>Rhipidomella vanuxemi</i> Hall.....			x			
<i>Schizophoria propinque</i> Hall.....			x		x	x
<i>Spirifer acuminatus</i> (Conrad).....				x		x
<i>Spirifer duodenarius</i> (Hall).....					x	
<i>Spirifer gregarius</i> Clapp.....			x	x	x	
<i>Spirifer grieri</i> Hall.....		x		x		
<i>Spirifer macrothyris</i> Hall.....			x			
<i>Spirifer manni</i> Hall.....			x			
<i>Spirifer varicosus</i> Hall.....		x				
<i>Stropheodonta hemispherica</i> Hall.....	x	x	x	x	x	x
<i>Stropheodonta perplana</i> (Conrad).....		x			x	
<i>Strophonella ampla</i> Hall.....			x			
PELECYPODA—						
<i>Conocardium cuneus</i> (Conrad).....	x	x	x	x	x	
<i>Modiomorpha subalata</i> (Conrad).....			*			
<i>Modiomorpha concentrica</i> (Conrad).....		x	x	x		
<i>Paracyclas elliptica</i> Hall.....					x	
<i>Pterinea flabellum</i> (Conrad).....			x			
<i>Sanguinolites sanduskiensis</i> Meek.....			x			
GASTROPODA—						
<i>Bellerophon pelops</i> Hall.....	x	x	x			
<i>Callonema bellatulum</i> Hall.....		x				
<i>Callonema lichas</i> (Hall).....			x	x	x	
<i>Callonema humile</i> Meek.....		x				
<i>Dentalium martini</i> (Whitfield).....		x		x		
<i>Pleuronotus decewi</i> Billings.....		*	x	x	x	
<i>Euryzone lucina</i> Hall.....			x	x		
<i>Hormotoma desiderata</i> Hall.....		x				
<i>Loxonema pexatum</i> Hall.....		x				
<i>Palaeotrochus kerneyi</i> (Hall).....			x			
CEPHALOPODA—						
<i>Orthoceras ohioensis</i> Hall.....		x	x			
<i>Potericeras eximium</i> Hall.....					x	
<i>Ryticeras columbiense</i> Whitfield.....			x	x		
<i>Spyroceras thoas</i> Hall.....		x				
CRUSTACEA—						
<i>Coronura diurus</i> (Green).....			x	x		
<i>Phacops cristata</i> Hall.....			x			
<i>Proetus rowii</i> Green.....			x	x		

* Collected by J. E. Schaefer.