Some Developmental Stages of Orthothetes Minutus N. Sp.

By Edgar R. Cumings.

The specimens discussed in this paper are from the abandoned quarry known as the Cleveland Stone Company's quarry, located one mile north of Harrodsburg, Monroe County, Indiana. This quarry is in the so-called Bedford limestone, and the specimens come from the top of the quarry—and also from near the summit of the formation. They are, so far as I can ascertain without having seen the original specimens of Hall.* specifically the same as Spergen hill forms referred by the latter gentleman to the Orthis (Terebratulites) umbraculum of Schlotheim.†

Description of the shell:

Shell semiovate to subquadrate in old individuals; hinge line usually less than the greatest width of the shell, especially in young individuals; cardinal extremities forming an obtuse, or sometimes a right angle with the lateral margins. Surface finely plicated; plications increasing toward the margin by interstitial addition. Crests of the plications crenulated by equally spaced fine concentric lines.

Ventral valve concave with a pronounced tendency to irregular growth about the beak. In mature individuals the beak becomes strongly retrorse and is greatly elevated, equaling in height one-half the length of the shell. Area well defined, flat, showing in well preserved specimens a low ridge on each side of the prominent deltidium and parallel with its margins. The younger specimens seem to show a perforation at the apex of the deltidium.

Dorsal valve regularly convex, greatest elevation about one-third of the way from the beak to the front margin, though there is considerable variation in this respect in shells of different age. Usually some flattening at the cardinal extremities. Area very narrow or usually scarcely at all conspicuous.

Interior of the ventral valve showing rather prominent teeth, which diverge widely. Cardinal process in the dorsal valve elevated, projecting

*Acting under the impression that some of the original specimens of Hall were in the Albany Museum, the writer sent a number of specimens of the form under consideration to Dr. John M. Clarke to compare with Hall's specimens. While owing to the fact that Hall's specimens are not at Albany, Dr. Clarke could not make the comparison, nevertheless he gives it as his opinion that the two are *probably* identical.

†Petrefk. I, 256; Schnurr, Brachiop. der *Eifel* 216; Bronn Lethæa Geog. I, 361. See Hall, Trans. Alb. Inst. 4, p. 12.

somewhat beyond the hinge line; notch shallow, the grooves on the posterior faces of the apopnyses very faint.

Ratio of breadth to length in an average adult specimen about as 11 to 8.

This species can not be referred to the *O. (Terebratulites) umbraculum* of Schlotheim, from which it differs in the less length of the hinge line, fewer number of plications, greater proportionate height of the area, which in the present species tends to become strongly retrorse in mature individuals, and the subquadrate rather than semicircular outline of the shells. The figures of Schlotheim's species also show it to possess a strongly quadrilobate cardinal process, while in the present form the notch in the process is very shallow and the grooves very faint.

The species to some extent resembles *O. lens*, from which it differs in the form of the cardinal process and in the greater proportionate length of the latter.

Development.—In the search for specimens of this rather rare species (about 50 specimens were found among several thousand of the common Spergen hill forms) a number of very young stages was obtained. While even the adult individuals share in the general stunting so characteristic of the entire Spergen hill fauna, no complete specimen in the writer's collection having a length of more than 5mm,* nevertheless these larger individuals present the usual features of maturity.

The smallest individual observed has a breadth of .9mm and a length of .6mm. In this specimen the ventral valve is roughly conical, though slightly more convex toward the beak, which projects over the hinge line and is very prominent. The surface shows 18 plications as against 40 in the largest individual observed, while the posterior third of the shell is without surface ornamentation except a few obscure concentric markings. The area is high and the deltidium less sharply marked off from it than in the older specimens. The dorsal valve has its greatest convexity at the center and is also smooth for a considerable distance from the beak. It shows no sign of an area.

Individuals of the length of 2mm have the area perpendicular to the plane of separation of the valves, and the ventral valve showing a slight concavity toward the front. The number of plications also has increased

*Since the above was written, the author has found at Stinesville, Monroe County, Indiana, specimens of this species over one inch in breadth, but agreeing in all essential features with the adult specimens described here.

to 22 or 23, and the region of greatest convexity in the dorsal valve has approached, somewhat, the beak. The youngest individual is conspicuously shorter on the hinge line than farther forward. In fact it in every respect approaches the generalized type of Brachiopod shell, as Beecher & Clarke have shown to be the case in the species of the Waldron fauna.*

The Cold-Blooded Vertebrates of Winona Lake and Vicinity.†

By Earl E. Ramsey.

Winona Lake is located in sections 15, 16, 17, 21 and 22 of Township 32 north, Range 6 east, in Kosciusko County, Indiana. The main body of the lake is about one mile southeast of Warsaw. It is one of the series of lakes belonging to the Mississippi drainage system and is drained into the Tippecanoe River. It lies about six miles south of the watershed between the St. Lawrence and the Mississippi basins.

The lake is irregular in outline and has an area of 0.98 square miles. The greatest length is from north to south and is somewhat more than one mile. The average width is about five-eighths of a mile. The greatest depth is 81 feet.

The lake, like all the small lakes of northern Indiana, is of glacial origin. The catchment basin is large as compared with the size of the lake itself. Unusually heavy rains change the lake level as much as two to two and one-half feet. The tributary streams are three in number. The largest is Cherry Creek, which flows into the lake on the southeast. For the most part it flows through woodland. Two other streams, the larger of which is Clear Creek, enter the lake at its extreme southern part. The output of Clear Creek is nearly as much as that of Cherry Creek. Numerous springs on the Winona Assembly grounds drain into the lake. Lands lying to the north are drained into Pike Lake and Center Lake, both of which lie about one mile northwest of Winona Lake.

The outlet is situated at the southern part of a small bay connecting with the main lake on the northwest. It empties into Tippecanoe River at a point about one mile northwest of Warsaw.

The shore line, for the most part, is low. On the north, a small stretch of cultivated land rises rapidly to a ten-foot elevation line. The Winona Assembly grounds on the east have the greatest elevation. This

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†Contributions from the Zoölogical Laboratory of the Indiana University, C. H. Eigenmann, Director, No. 39.