

No. 5.— *The Kiln Shale Fauna*

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INTRODUCTION

The fossils here considered were collected in the summer of 1929 as part of the work done in the Harvard Summer School of Field Geology, which was conducted in Jasper Park, Alberta. They were found in concretions scattered through a black fissile shale, the Kiln formation, at an outcrop three miles south of Pocahontas on the eastern side of the Athabaska River (for the stratigraphic relations of this formation, see Raymond, 1930, p. 296).

The writer wishes to acknowledge the generous help of Professor P. E. Raymond, under whose tutelage this paper has been prepared.

CORRELATION

The fauna is related to that of certain shales in the Mackenzie River Valley, the Three Forks shale of Montana, and the Naples of New York.

The first indication of this type of fauna appears in the Coronach black shale, some 300 feet below the Kiln formation, in the presence of *Posidonia* cf. *P. attica* (Williams) and *Ontaria* cf. *O. halli* Clarke, in the Roche Miette section (Raymond, 1930, p. 296) and *Ontaria* sp. Ind., *Pterochaenia* cf. *P. fragilis* (Hall), and *Bactrites* cf. *B. aciculum* Hall, in the section near Snaring Junction (*idem.*, p. 297).

This fauna is like one of Portage age described by Kindle (1919) from the Mackenzie River Valley, in the presence of *Buchiola retrostriata* (von Buch), *Entomis variostriata* Clarke, *Styliolina fissurella* (Hall), and representatives of the genera *Tentaculites* and *Bactrites*.

Another similarity is the paucity of brachiopods, only one, *Cyrtina glabra* Kindle, having been found in the Mackenzie region, while the Kiln shale collection shows only a few *Lingulas* and a *Leiorhynchus*. *Buchiola retrostriata* (von Buch) is the commonest fossil in both regions, with the exception of *Styliolina fissurella* Hall, in the Kiln formation.

Kindle (*op. cit.*) found *Ontario clarkei* (Beushausen), *Paraptyx* cf. *ontario* Clarke, *Paracardium doris* Hall, and *Entomis serratostriata* Sandberger, all of which are characteristic of the Naples section. They

do not appear in the Kiln shale. Likewise his new species *Cyrtina glabra*, *Buchiola dilata*, and *Tentaculites mackenziensis* are absent. Kiln shale fossils not found in the Mackenzie region are *Euthydesma subtextile* Hall, *Tentaculites scalariformis* Hall, *T. annulatus* Schlotheim, *Entomis nodosa* n. sp., *Praecardium laticostatum* n. sp., *Lingula melie* Hall, *Leiorhynchus athabascense* n. sp., *Tornoceras bicostatum* Hall, and *Bactrites gracilior* Clarke.

Bactrites and Tentaculites occur at both localities, but in different species.

The only link with the Three Forks fauna is the presence of Tornoceras and Bactrites, (Raymond, 1909, p. 152), and of Entomis and Leiorhynchus (Raymond, 1907, pp. 118, 119).

All the Kiln shale genera are to be found in the New York section, although the species of Lingula, Leiorhynchus, Praecardium, and Tentaculites are not the same in the two regions (Clarke, 1904). The forms common to both localities are *Buchiola retrostriata* (von Buch), *B. conversa* Clarke, *B. scabrosa* Clarke, *Euthydesma subtextile* Hall, *Styliolina fissurella* (Hall), *Tornoceras bicostatum* Hall, *Bactrites gracilior* Clarke, and *Entomis variostriata*.

On the basis of community of genera and species, the Kiln fauna seems more like the Naples fauna of New York than that of the Three Forks shale of Montana. The stratigraphic position of the Kiln shale, however, 2500 feet above the Perdrix shale, which is shown by the presence of *Manticoceras* sp. ind. to be Middle Upper Devonian (Raymond, 1930, p. 298) indicates that the Kiln is highest Upper Devonian, and thus equivalent to the Three Forks shale.

In the Jasper section the *Spirifer whitneyi* fauna occurs in the Boule formation, and also in the overlying Coronach. Three hundred feet of Fiddle limestone follow, then the Kiln shale.

Further north in Canada, in the Mackenzie Valley, Kindle (1919, p. 2) found the *Buchiola retrostriata* fauna in shales beneath limestone containing the *Spirifer disjunctus* assemblage just as in New York. If *Spirifer whitneyi* and *S. disjunctus* characterize strata of the same age, the situation in Jasper Park is anomalous, the fossils appearing in reverse order.

It seems, therefore, that the Portage fauna survived longer in the Jasper region than in the Mackenzie district. In the latter it died out when the *Spirifer disjunctus* fauna came in, but in the more southern region, where conditions were more favorable to the deposition of great thicknesses of shale, it persisted longer than the *Spirifer whitneyi* fauna.

Description of the Fauna

BRACHIOPODA

LINGULA MELIE Hall

Hall, Palaeontology of New York, 4, 1867, p. 14, pl. 1.

The concentric striae of this form are present, but the coarser radiating striae are not.

LEIORHYNCHUS ATHABASCENSE spec. nov.

Outline similar to that of *L. mesacostalis* Hall, but the posterior margin makes a slightly more obtuse angle at the beak. Both valves are moderately convex. The eight broad plications, generally well marked on the anterior half of the shell, become obsolescent toward the beak, so as to leave the posterior third of the shell smooth.

The fold, which is of the same length as the longest plications, has a conspicuous sinus. A small ridge extends the length of this sinus, almost to the beak. There is a broad convex ridge in the sinus of the pedicle valve.

PELECYPODA

BUCHIOLA RETROSTRIATA (V. Buch)

Clarke, Naples Fauna in Western New York, pt. 2, Mem. VI, N. Y. State Mus., 1904, p. 295, pl. 10, figs. 1-14.

The specimens at hand show no points of difference from those in the New York beds. The number of plications is usually twelve. The sulci and the characteristic retrally curved ridges on the summits of the ribs are just the same as in the fauna described by Clarke.

This is the most abundant species in the fauna, with the exception of *Styliolina fissurella* (Hall).

BUCHIOLA CONVERSA Clarke

Clarke, Naples Fauna in Western New York, pt. 2, Mem. VI, N. Y. State Mus., 1904, p. 295, pl. 10, fig. 22.

The flat-topped ribs which become concave toward the periphery are characteristic of this form. On the anterior and posterior slopes of the valves, the ribs are less distinct, and may be absent in the umbonal region.

BUCHIOSA SCABROSA Clarke

Clarke, Naples Fauna in Western New York, pt. 2, Mem. VI, N. Y. State Mus., 1904, p. 229, pl. 10, figs. 25-28.

One specimen shows the coarse retral ridges on the ribs over the umbonal region, which become fine and crowded on the ventral half of the shell. Clarke does not state whether this change in ornamentation is abrupt, or whether there is a zone of blending of the two types of ridges. The figures seem to indicate the latter. In the Jasper form, however, the change is abrupt, with no intermediate types of cross ridges. This change occurs at the same distance from the beak on all the ribs.

EUTHYDESMA SUBTEXTILE Hall

Hall, Palaeontology of New York, V, Lamellibranchiata, II, 1885, p. 385, pl. 63, figs. 11-16; pl. 93, figs. 28, 29.

Clarke, Naples Fauna in Western New York, pt. 2, Mem. VI, N. Y. State Mus., 1904, p. 292, pl. 9, figs. 8-17.

The only specimen, a left valve, is incomplete in the absence of the distal portion of the sub-alate cardinal expansion, but can be reconstructed with fair accuracy by means of the concentric growth lines. So reconstructed, the shell does not differ materially in outline from the New York specimens figured by Hall. The concentric striae are conspicuous over the entire shell; fine striae radiating from the beak to the margin can be seen only under a lense.

The shell is very small, being only 10 mm. in height, whereas the New York specimens measure between 30 and 40 mm.

PRAECARDIUM LATICOSTATUM spec. nov.

One specimen, a right valve. Shell strongly convex, with high beak. Anterior lateral expansion steeper and less broad than posterior. There are fourteen strong radiating ribs. In other species, the ribs are less broad than the intervening sulci, but in this form the ribs are the larger. The bottoms of the grooves are more strongly curved than the tops of the ribs, although the latter are not flat, as in some species. The ribs show a tendency to rugosity, giving a rather lumpy appearance. At no place on the shell are the sulci wider than the ribs, and both increase in size as they approach the margin of the shell, the

coarsest of the ribs being about twice the size of the intervening troughs. The height of the shell is 3.7 mm. For revisions of this genus cf.

Barrande, *Système Silurien de la Bohême*, 6, Texte I, 1881, p. 141-44, pls. 87-97; 285, 359, 360.

Clarke, *Naples Fauna in Western New York*, pt. 2, Mem. VI, N. Y. State Mus., 1904, p. 305.

TUBICOLA ?

TENTACULITES SCALARIFORMIS Hall

Hall, *Palaeontology of New York*, 5, pt. 2, 1879, p. 167, pl. 31, figs. 3-11.

The single specimen shows conspicuous annulations, from the crest of which the slope of the surface to the main line of the shell is less steep in the direction toward the apex than toward the apertural end. The shell is deformed close to the apex, so no accurate measurement could be made.

TENTACULITES ANNULATUS Schlotheim

Schlotheim, *Die Petreäctenkunde*, 1820, p. 377, pl. 29, fig. 8, a and b.

Dunker & Meyer, *Palaeontographica*, 3, pt. 1, 1850, p. 21; pl. 3, fig. 36.

The original figure of this form by Schlotheim is so poor as to be of no assistance in identification. The one pyritized specimen does agree with the illustrations and description by Dunker and Meyer.

Sixteen annulations have been preserved. The sides of the annulations closer to the apex slope away from the main line of the shell at a rather steep angle; the other ribs are perpendicular to the general line of the shell. Length, 1.2 mm.

PTEROPODA

STYLIOLINA FISSURELLA (Hall)

Hall, *Palaeontology of New York*, 5, pt. 2, 1879, p. 178, pl. 31A, figs. 1-30.

This is the most abundant fossil in the fauna. The Jasper specimens range from .5 mm. to 1 mm. in length, while those in the Styliolina layer of the Genesee shale of New York range from 1 mm. to 2.5 and 3 mm.

CEPHALOPODA

TORNOCERAS BICOSTATUM Hall

Clarke, The Naples Fauna in Western New York, pt. 1, 16th Ann. Rept. State Geol., 1898, 1899, p. 118, pl. 8, figs. 4-13.

Hall, Palaeontology of New York, 5, pt. 2, 1879, p. 450, pl. 72.

Two specimens show almost complete closure of the umbilicus. The surface markings radiate from the umbilicus in weak curves, the degree of curvature of these growth lines changes; and at the margin, the lines tend to parallel the periphery.

In contrast with the other members of the fauna this form is of normal size compared with the New York specimens. Clarke states that "at maturity the species seems seldom to surpass a diameter of 25 mm." The larger of the two specimens at hand is 27 mm.

BACTRITES GRACILIOR Clarke

Clarke, The Naples Fauna in Western New York, pt. 1, 16th Ann. Rept. State Geol., p. 124, pl. 9, figs. 1-16, 1898 (1899).

The shells have collapsed longitudinally, giving the appearance of two small individuals lying side by side. The form of the shell and the character of the markings differ in no respect from those of the New York specimens.

Crustacea

OSTRACODA

ENTOMIS VARIOSTRIATA Clarke

Kindle, Canada Department of Mines, Geological Survey. Mus. Bull. 29, Geol. Series 36, 1919, p. 7, pl. 2, figs. 1-3.

Clarke, Naples Fauna in Western New York, pt. 2, Mem. VI, N. Y. State Mus., 1904, p. 344, fig. 13.

The specimens show the concentric sculpture characteristic of this form; the reticulation is very fine.

ENTOMIS NODOSA spec. nov.

The shell is moderately convex, and ovate in outline; the sulcus well defined from the dorsal margin to the small muscle pit at the top of the valve; from that spot to the ventral margin it is less distinct.

The reticulation does not follow any definite geometric pattern, but toward the edge of the valve suggests lines parallel to the margin.

Small nodes are scattered over shell, with or without definite geometric arrangement. On the anterior end of one specimen there are four distinct nodes in a row running transversely across the shell, half as far from the end of the valve as from the sulcus. There is a row of three knobs parallel to the dorsal margin, the middle knob being also the terminal node of the above described row. Another pustule is situated slightly behind and ventrad to the pit which lies in the sulcus at the top of the valve. One other node rises above the surface slightly behind the sulcus and at about one-third of the distance from the dorsal edge to the antero-posterior median line of the valve.

In another specimen the small nodes are scattered over the anterior two-thirds of the valve, seemingly without definite pattern, except for a row analogous to that in the specimen described above; in the second specimen, however, this row is on the posterior end.

The largest specimen is 2.3 mm. long, and 1.6 mm. wide across the sulcus.

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