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A HIGHLY ALATE SPECIMEN OF *ATRYPA RETICULARIS* (LINN.)

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The most abundant fossil in the upper part of the Wapsipinicon beds at Independence and elsewhere in east central Iowa is a fine-ribbed representative of *Atrypa reticularis* (Linn.).[1] This species is found in every fossiliferous horizon in the Devonian of the state. Indeed, it is world wide in its distribution and is the "longest lived of all known organisms,"[2] ranging from early Silurian through the Devonian into the early Mississippian.[3] Generally speaking, however, the species came to an abrupt end with Devonian time although the genus continued on for a brief period into the Mississippian.[4] In a species ranging so widely both vertically and geographically many varietal forms are usually developed. In the Devonian of Iowa nearly every horizon that may be set off at all sharply by lithological or faunal differences has its peculiar variety or mutation of *A. reticularis* which in some cases perhaps could be well designated as good species. Such a variety is the fine-ribbed, rather robust form from Independence which has "a tendency to become alate at the cardino-lateral angles, and having a form that is decidedly lenticular, particularly in the young and half grown individuals."[5] In rare cases the curious marginal alations or fringes are preserved.

Specimens illustrating marginal alations were obtained by the late Professor Calvin from a quarry in the suburbs of Independence many years ago. The quarry which furnished the best specimens has long since fallen into disuse so that good examples are now obtained with difficulty.

The alations or winglike expansions are made up of a number of thin lamellæ which extend from the surface of the valves,

[1]Iowa Geol. Surv., vol. viii, 1898, p. 229.
[2]Clarke and Swartz, Maryland Geol. Surv., Upper Dev., 1913, p. 586.
[3]Herrick; Bull. Sci. Lab. Denison Univ., vol. iii, 1887, p. 98, pl. iii, fig. 11; vol. iv, 1888, pl. ix, fig. 7.
[4]For example, *Atrypa infrequens* Weller. Ill. Geol. Surv., Monog. I, 1914, p. 285, pl. xxxv, figs. 1-5, Glen Park limestone (Kinderbook), Glen Park, Missouri.
[5]Calvin; Amer. Geol., vol. 8, 1891, p. 143.

arising from what are generally regarded as lines of growth on the ordinary Atrypa shell. These concentric lines, however, are rather more than records of halts in the growth of the shell, in appearance they approach varices where the plications are slightly dilated and elevated as may be seen on shells from which the lamellæ are removed. Each lamella extends outward in such a way as to make a small angle with that part of the shell proper which continues beyond the line of their common union. The successive lamellæ lie more or less closely one upon another near their bases but out toward their margins they are considerably separated and the spaces between them are filled with the ordinary matrix in which the shells are preserved. There is no evidence that the lamellæ ever coalesced. Their surfaces partake of the characteristic markings of the shell itself and the plications or ribs on the lamellar surfaces are continuations of those on the shell; with growth the plications increase in size, bifurcate, and so on, as do those which continue over the shell. The lamellar surface is wrinkled and uneven in contrast with the smooth evenly rounded surface of the valves. As seen in section the lamellæ vary in thickness and the outer and inner surfaces of each lamella are similarly plicated, that is, each lamella is a rigid corrugated layer. The plications on one lamella do not coincide either in size or always in direction of growth with those on the surfaces of adjacent lamellæ immediately above or below.

The alation is developed in a plane roughly parallel to a plane passed between the valves; its lateral development along the posterior margin gives the shell the appearance of having a long straight hinge-line; anteriorly the lamellæ bend to conform to the sinuosity of the front margins of the valves.

The hardness of the rock in which the Iowa specimens occur and the fragility of the lamellæ make it difficult to disengage a complete specimen. The one here figured is so broken along the margin that the full size is not known. Even fragmentary preservation is rare; the shells showing alations in the collection at hand as well as those seen in the field are usually mature and old individuals,—more frequently the latter, since "those [lamellæ] upon the umbonal and median surfaces of the valves, have been worn off during the life, or before the fossilization of the shell."[6]

[6] Hall and Clarke; Pal., N. Y., vol. viii, pt. ii, p. 168, Albany, 1894.

This feature on *A. reticularis* was pointed out and illustrated sixty years ago by the Sandberger brothers on a specimen from the Rhenish Devonian of Germany.[7] Davidson[8] described and illustrated some interesting examples of *A. reticularis* with "foliated expansions" from the Wenlock limestone, Silurian, of England. Whiteaves[9] figured a specimen from the Devonian of Canada. His figure illustrates the lamellæ remarkably well. Its greatest width is 14 millimeters more than that of the specimen here illustrated from Independence. Clarke and Swartz[10] discuss this feature on specimens of this species from the Devonian of Maryland. Other references could easily be added but these will suffice to show that this feature is not limited to the Atrypas of any given locality. Moreover, it seems to have been a characteristic of *A. reticularis* at various times throughout its history and doubtless was developed to a greater or less extent on several of its many varieties. What the purpose of these excrescences could have been we can only conjecture. Such seemingly useless and extravagant skeletal matter in many cases presages racial old age and final extinction but their presence on members of the species in the Silurian soon after the species had made its appearance seems to preclude this explanation. It is quite possible that short lived offshoots of the species, destined to disappear, developed these encumbrances during their later stages.

The alate specimen which is the subject of this article has a maximum width of 10 cm. and a length of 6.5 cm.; the "hinge-line" is 7.3 cm. long. The lamellæ which are preserved are all outgrowths of the pedicle (ventral) valve, those formerly on the brachial (dorsal) valve having been almost wholly broken away; the width of the alation on the specimen averages three centimeters.

Specimens from the same bed, on which the alations are not preserved, show the usual expression of the species. The non-lamellate specimens illustrated in the accompanying plate are quite similar to those described and illustrated from the same bed by James Hall in 1858.[11]

[7]Die Verstein. d. Rhein. Schicht. in Nassau, pl. xxxiii, fig. 1, Weisbaden, 1856.
[8]British Sil. Brach., pp. 129-133, pl. xiv, figs. 1, 2. London, 1867.
[9]Contr. Can. Pal., vol. I, pt. iv, p. 289, pl. xxxvii, fig. 8; Ottawa, 1892.
[10]Maryland Geol. Surv., Upper Dev., p. 586, pl. lv, figs. 6, 10; Baltimore, 1913.
[11]Hall's Geol. of Iowa, vol. I, pt. II, p. 515, pl. vi, figs. 4, 5.

Occurrence: Calvin's "*Spirifer pennatus*" beds, uppermost part of the Wapsipinicon stage (Fayette breccia), Devonian; near Independence, Iowa.

Specimens in the paleontological collections of the University of Iowa.

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EXPLANATION OF PLATE V C.

Atrypa reticularis (Linnæus).

Figure 1. Pedicle view showing the strong development of the marginal lamellæ. Note the fine ribs on the shell and the wrinkling of the lamellar surface.
No. 600, x $\frac{1}{1}$

Figure 2. Same specimen. Posterior view.

Figures 3, 4. Lateral and pedicle views of a young specimen showing the fine ribs and the "decidedly lenticular" form mentioned by Calvin. No. 601, x $\frac{1}{1}$

Figures 5, 6. Lateral and brachial views of a nearly mature example showing the initiation of greater convexity in the brachial valve. Note the rather weakly developed varices on this and the preceding.
No. 602, x $\frac{1}{1}$

Figures 7, 8. Brachial and lateral views of an old individual. Note the strong sub-equally spaced varices from which the lamellæ have been broken off.
No. 603, x $\frac{1}{1}$