Note on the Variation of the Spires in Seminula argentia (Shepard) Hall.

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[Abstract.]

Owing to the systematic importance and the rarity of good material of the brachial framework of the brachiopods, any light on the extent of individual variation of these parts is of considerable importance. In examining several specimens of *Seminula argentia* (shepard) Hall, which show the position and form of the spiralia, some remarkable results were obtained.

Both valves of this species are quite convex, old specimens always being very ventricose. However, the species is very variable in form. Four of the thirteen specimens were somewhat compressed, but it so happens that three of these approach the normal type very closely, while the fourth does not vary from it greatly. Those showing greatest variation have not been subject to any visible external deformation.

The normal position of the spire is with the apex pointing to the side, near the margins of the valves, at or a little in front of the middle of the shell, which is also its widest part. In the central part of the cavity of the shell the edges of the spire nearly or quite meet. Anteriorly they flare apart leaving a subcircular opening. For convenience in this paper this opening will be referred to as the frontal aperture of the spiralia.

A specimen from the Topeka limestone, Upper Cual Measures, shows the spires with the apex of one of them pointing almost directly forward toward the anterior end of the shell, turned through an angle of about 90 degrees from its normal position; while, as nearly as can be determined from the ground specimen, the apex of the other is directed toward the median line of the pedicle valve just in front of the hinge. This specimen was selected and ground nearly to the center because it was one of typical form and perfect exteriorly. The remaining specimens are all from one horizon in the Permian of Cowley County, Kansas. One of these has the spire turned through an angle of 45 degrees or more in a vertical direction (when held brachial valve up and hinge away from observer) pointing near the middle of the right side of the brachial valve, while the opposite spire points toward the middle of the opposite side of the pedicle valve. Another specimen from the same locality is intermediate between this and

the normal form. There are other specimens showing a similar variation and several are normal. The frontal aperture varies from subcircular to a mere slit.

The form of the spire varies from a fairly well-developed spiral cone with flaring base and acute apex to a form approximating a disk with very obtuse apex. The most disk-like form observed belongs to a shell less ventricose than the average and the spire is turned from the normal position. The number of whorls in the spires seems to vary slightly, though the material at hand does not admit of certain determination in this respect. Unfortunately the crural attachments of the spires are not shown in any of the specimens. However they must have been somewhat modified to accommodate the twisted position of the spires, unless, in the specimens examined, the spires which are abnormal had broken loose in the shell prior to fossilization, which I believe is improbable.

The above variations, except in the case cited, do not seem to accompany any particular form of shell. There is nothing visible in the specimens to show the cause of their abnormality.

It is dangerous to generalize much on the observations based on a single species. All that I suggest is that the foregoing seems to indicate that in those spire-bearing brachiopods, particularly the Athyridae, where the form of the shell does not govern the form and position of the spire, i. e., those which approach a spherical form, the spiralia may be subject to a considerable variation both as to the form of the spire and its position.

Topography and Geography of Bean Blossom Valley, Monroe County, Indiana.

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In Monroe County, Indiana, and others lying to the southwest (Owen, Greene, Martin, Dubois, Pike and Gibson) occur a number of preglacial river valleys the present topography and content of which unmistakably suggest the existence of a temporary period of laking. Inasmuch as the attenuated edge of the Illinoian till plain passes diagonally through the above counties and crosses the mouths of many of the southern tributaries to the west branch of White River, which present evidence of arrested drainage near the limit of the till plain, it seems probable that the laking was consequently connected with the glaciation of the immediate region.