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NOTES ON THE POSITION OF THE INDIVIDUALS IN A GROUP OF *NILEUS VIGILANS* FOUND AT ELGIN, IOWA.

BY G. E. FINCH.

David Dale Owen made note more than fifty years ago of the multitudes of fragmentary specimens of *Asaphus iowensis* in an exposure at the junction of Otter creek with the Turkey river at Elgin, Iowa. From then on, that locality has been classic trilobite territory. The most abundant species to be found entire there now, if good trilobites can be said to be abundant anywhere, is *Nileus vigilans*, which occurs both enrolled and more or less straightened in form. Everyone who has collected this species knows it to be gregarious. The collector may look for hours without finding a single specimen, then pick up two or three nice ones in as many minutes. In the summer of 1903 it was my fortune to find in *situ* on a small rock two or three feet in length by one foot in width, some fifteen entire specimens. The place is a rocky run, a mile below Elgin, on the north side of Turkey river; and the horizon is in the Maquoketa shales about forty feet above the base. The stratum in which they were imbedded is of limestone, about two or three inches in thickness and without apparent lamination. Overlying it is a thin, argillaceous, laminated layer separating it from another limestone layer above.

The trilobites found there were all entire ones and belonged to the same species, *Nileus vigilans*, the *Asaphus vigilans* of Meek and Worthen* Some were nearly rolled

*Minn. Geol. Surv. Vol. III, pt. II, page 712, and Geol. Surv. Ills., Vol. II, page 497, and pl. 23, fig. 6.

up, but the majority were about straight. Their prevailing position is: cephalic portion extending horizontally near the surface of the stratum and just appearing at its surface, thorax and pygidium extending downward through the stratum. Different sized individuals maintain the same upper level at the upper surface of the stratum, the larger ones extending farther downward. Their heads sometimes appear flattened as if from vertical pressure, while the thoracic portions are doubled, bent and distorted in several specimens as if from the same cause.

As to why every one of these animals, at the place mentioned, should be found cephalon up we must seek the explanation in their habits. But this quest involves us at once in difficulties because the entire sub-class of which they were members became extinct long ago. We have the authority of Zittel* that little is known of trilobites' habits. It is known from the fossil remains of brachiopods, crinoids, etc., found in their company, that they were salt water animals. Some species preferred deep water, others shallower, and one genus, Trinucleus, lived partly buried in the mud.

The uniformity of position of such a number of fossil remains would defeat the supposition that they were mere empty carapaces shed by moulting individuals. In that case we should have found some remains horizontally placed, or axis downward, or pygidium upward instead of all in the same position. Their pygidia would not have been of sufficient density to sink, and at the same time their cephala buoyant enough to float. If carapaces, some should certainly have had facial sutures open or free cheeks missing.

If, then, as seems evident, they took the position in which they were fossilized, voluntarily as living creatures, can we not from that fact find some light on their condition at that time? It does not seem possible that they hid themselves in burrows, because of their being marine rather than land animals. Their bent and distorted condition also would hardly be the position of such an animal

*Zittel, Text-Book on Paleontology, Eastman's trans. 1, 617.

in a burrow. In addition, cross-setting and polishing or etching the cut surface fails to bring out any circular boundary lines of burrows, such as we should expect the limestone to preserve.

Still the animal could hardly be expected to erect itself on its pygidium, and at first blush it seems ridiculous to suppose that it had the power to press itself backward into the soft mud. But that seems the only tenable theory. It is supported by the character of the pygidium of *Nileus vigilans*, broadly wedged-shaped, stout, and entire of margin. It is likewise supported by the fact that some modern crustaceans have a similar habit.

The facts observed would indicate that this group of trilobites were voluntarily buried posteriorly, and that anteriorly they kept their eyes above the surface of the sediment until, as it rapidly accumulated, they met their death, and were buried by the next layer of rock-forming material.