

## ART. XXXVI.—A New Ordovician Eurypterid; by ELLIS W. SHULER.

DURING the summer of 1914, the writer collected fossils from the Bays sandstone at various points along Walker Mountain in southwestern Virginia. The collection at Lyons Gap yielded a few Eurypterid fragments. This is one of the best known localities for collecting in the Bays sandstone. Prof. J. J. Stevenson visited the locality in 1884 and secured a number of fossils among which were "*Ambonychia radiata*" and "*Rhynconella capax*" (= *Orthorhynchula linneyi*), and since that time it has been visited by a number of other geologists. These facts are mentioned because the Bays sandstone formation is for the most part unfossiliferous in Walker Mountain. The fossiliferous localities are limited to the southwestern section of the mountain along a band about twenty miles in length.

At Lyons Gap the fossil-bearing bed is about ten feet in thickness and occupies approximately the middle of the Bays formation, ninety feet below the Clinch sandstone. The point, however, of separation of the Bays sandstone from the Sevier shales below is a somewhat arbitrary one. The bed is an argillaceous sandstone which has a pronounced brick red color. It seems worthy of note that the bed carrying marine fossils is distinctly redder than the non-fossiliferous part of the sandstone. The southwestern section of the Bays sandstone along Walker Mountain, carrying the fossiliferous horizon, is also, on the whole, a deeper red than the section along the mountain to the northeast, which is practically barren of fossils.

*Stylonurus (Ctenopterus)? alveolatus* sp. n.

The Eurypterid fragments consist of parts of four post-oral limbs; a part of the telson spine with the impression of two abdominal segments, and a fragmentary carapace.

The best preserved fragment is that belonging to the second or third endognathite, fig. 4. It consists of three segments, all of which, after making allowance for mashing due to the conditions of preservation, show a distinct dorsi-ventral flattening. The articulation of the joints is such as to permit flexing movements downward and backward, an arrangement which suggests an adaptation of the limb to swimming. The individual segments are distinctly elongated, being on the average twice as long as wide. The lengths of the successive segments beginning with the proximal one are: 16<sup>mm</sup>, 16<sup>mm</sup>, and 20<sup>mm</sup>. The corresponding widths are: 10<sup>mm</sup>, 8<sup>mm</sup>, and 6<sup>mm</sup>.

The posterior margin of the proximal joint is supplied with two prominent spines or flattened bristles, the larger of which occupies the distal corner. This is the largest spine preserved. It has a length of 41<sup>mm</sup>. The width, 2<sup>mm</sup>, is fairly uniform along its whole length. In common with the other spines it originates in a projecting alveolar process or ring-like swelling of the integument at the base, which from its unusual development, is a significant characteristic of this species. The smaller

FIGS. 1-6.

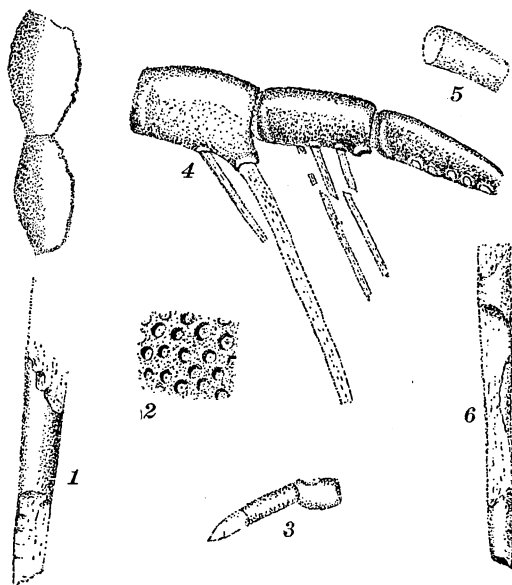
FIGS. 1-6. *Stylonurus (Ctenopterus) alveolatus* sp. n.

Figure 1. A part of the telson spine with the impression of two abdominal segments. Figure 2. Moulds of the tubercles on a fragment of the carapace ( $\times 2$ ). Figure 3. Endognathite probably belonging to the first pair of post-oral appendages. Figure 4. Endognathite belonging to the second or third pair of post-oral appendages. Figure 5. Undetermined fragment of an appendage. Figure 6. A fragment of a joint from the walking leg. All figures except figure 2 natural size. The specimen represented in figure 4 is to be considered the holotype of the species.

spine has a measured length of 14<sup>mm</sup>. The broken jagged ends indicate that the spines were originally much longer.

The adjacent segment shows four alveolar processes with parts of three spines preserved. Again the distal corner was occupied by the largest spine. All spines have been lost from the third segment but five alveolar processes are seen, the dis-

tal one being the larger. The alveolar processes in all the segments have a distinct serial arrangement along a median line. The pronounced flattening of the bristles or spines gave a much enlarged paddle-like surface to the whole endognathite.

The anterior margins of the segments show a smooth arcuate curve without dentition. The joints show the expected thickening around the articulating surfaces.

The second appendage, fig. 3, also shows three segments. These are shorter and more robust than the joints of the appendage just described. They do not show spines, though this may be due to the conditions of preservation. The fragment is probably a part of the first endognathite. The measurements, beginning with the proximal joint, are as follows: length, 8<sup>mm</sup>, 7<sup>mm</sup>, 7<sup>mm</sup>; the corresponding widths are: 4<sup>mm</sup>, 2.5<sup>mm</sup>, 2<sup>mm</sup>.

A part of the telson spine with the impression of the last two abdominal segments is shown in fig. 3. The posterior segment has a length of 16<sup>mm</sup>; the second has a length, estimated from the curvature of the mould, of 19<sup>mm</sup>. A number of measurements of *Stylonurus* and other Eurypterida showed a rather constant ratio between the length of these two segments and the total length of the individual. This ratio was approximately one to eight. While no special stress is laid on such a ratio, it is interesting that this would indicate that the complete specimen was 280<sup>mm</sup> long (about eleven inches).

Fig. 6 represents what appears to be a segment of one of the walking or balancing legs, typical of *Stylonurus*. It has a length of 30<sup>mm</sup>, but this probably does not represent the total length of the segment. The width at the proximal end is 4<sup>mm</sup>; at the distal end, 2.5<sup>mm</sup>. Fig. 5 shows a fragment of an unidentified limb.

The fragment of the carapace shows the mould of one of the compound eyes, two depressions questionably identified as ocelli, and the impression of a rough tubercular surface. The supposed ocelli lie well back behind the compound eye and the general appearance is more that of *Eusarcus* than *Stylonurus*. The state of preservation is, however, such as to preclude a definite identification or exact description. Fig. 2 shows an enlarged view ( $\times 2$ ) of the tubercular moulds.

This merostome has been provisionally referred to *Ctenopterus*, a sub-genus of *Stylonurus*, on account of the long flattened segments of the endognathite; the lack of serrations on the segments such as is found in *Eurypterus*; the presence of the long joint belonging probably to the walking leg or balancer, characteristic of *Stylonurus*; and the long broadened spines or bristles which are especially characteristic of the sub-genus *Ctenopterus*. It has been given the specific name *alveo-*

*latus* in recognition of the very pronounced development of the alveolar processes surrounding the spines.

The endognathites figured above are in many respects similar to those figured by Clarke and Ruedemann (N. Y. State Museum Memoir 14, 1912, Vol 2, p. 541) under the name *Stylonurus* (*Ctenopterus*) *multispinosus*. This species possesses elongated joints fringed with spines along the posterior margin. While there is a difference in the general shape of the joints the chief distinction between the species *multispinosus* and *alveolatus* is in the prominent development of the alveolar process and the unusual size of the distal spine in the specimen from the Bays sandstone. *Stylonurus* (*Ctenopterus*) *multispinosus* Clarke and Ruedemann occurs in the Pittsford shale of the Middle Silurian. It is interesting to find an Ordovician species so strikingly similar to a form which comes from a much higher horizon in the Silurian.

Dr. Bassler and others have correlated the Bays sandstone with the Lorraine of New York. Dr. A. W. Grabau has made it the equivalent of the late Maysville and Richmond. The general character of the fossils collected with the Eurypterid fragments certainly establishes a correlation with the Upper Ordovician, and probably Maysville rather than Richmond.

In the "Table of the Geologic Distribution of the North American Species of Eurypterids at Present Known" (N. Y. State Bull., Memoir 14, 1912, p. 431), representatives in the Ordovician have been reported from the Normanskill shale, the Schenectady beds, and the Utica. One species has been reported from the Richmond.

The bionomic interest of the find lies in the association of the fragments with a typical marine fauna. One of the joints was found resting against a specimen of one of the most abundant of the Bays brachiopods. Such an association falls in line with the general occurrence of Ordovician Eurypterid remains with those of marine organisms. The delta-like and near-shore character of the Bays sediments is evident. But though the fragmental character of the Eurypterid remains indicates transportation and a consequent breaking up of a complete exoskeleton, the occurrence at Lyons Gap gives no indication that this took place in a fresh water stream rather than in surf along the shore. On the whole, the find seems to confirm Laurie's suggestion that *Stylonurus* possessed purely littoral habits.