ART. XV.—*On the Early Stages of Brachiopods*; by E. S.
MORSE.*

THE writer made a visit to Eastport, Maine, early in the summer, for the purpose of discovering the early stages of a species of Brachiopod (*Terebratulina septentrionalis* Couth.) so abundant in those waters. As little has been known regarding the early stages of this class of animals the facts here presented will be of interest, as settling beyond a doubt their intimate relations with the Polyzoa. As the subject will be fully presented at the meeting of the American Association, only the more important features will be mentioned here. In a few individuals the ovaries were found partially filled with eggs.

* From the American Naturalist, September, 1869.

The eggs (fig. 1) were kidney-shaped, and resembled the statoblasts of *Fredericella*. No intermediate stages were seen between the eggs and the form represented in fig. 2. This

stage recalled in general proportions *Megerlia* or *Argiope* in being transversely oval, in having the hinge-margin wide and straight and in the large foramen. Between this stage and the next the shell elongates until we have a form remarkably like *Lingula* (fig. 3), having, like *Lingula*, a peduncle longer than the shell, by which it holds fast to the rock. It suggests also in its movements the nervously acting *Pedicellina*.

In this and the several succeeding stages, the mouth points directly backward (forward of authors), or away from the peduncular end (fig. 4), and is surrounded by a few ciliated cirri, which forcibly recall certain *Polyzoa*. The stomach and intestine form a simple chamber, alternating in their contractions and forcing the particles of food from one portion to the other. At this time also the brownish appearance of the walls of the stomach resembles the hepatic folds of the *Polyzoa*. Fig. 5 shows a more advanced stage, where a fold is seen on each side of the stomach; from this fold the complicated liver of the adult is developed, first, by a few diverticular appendages, as seen in fig. 6.

When the animal is about one-eighth of an inch in length the lophophore begins to assume the horse-shoe shaped form of *Pectinatella* and other high *Polyzoa*. The mouth at this stage (fig. 6) begins to turn toward the dorsal valve (ventral of authors), and as the central lobes of the lophophore begin to develop, the lateral arms are deflected, as in fig. 7. In these stages an epistome is very marked, and it was noticed that the end of the intestine was held to the mantle by attachment, as in the adult, reminding one of the *funiculus* in the *Phylactolaemata*. No traces of an anus were discovered, though many specimens were carefully examined under high powers for this purpose, the intestine of the adult being repeatedly ruptured under the compressor without showing any evidence of an anal aperture.