

bers frequently fused into a common mass. The nuclear conditions in these large fusion-masses offer an interesting object for study.

At the end of a period slightly longer than in the normal development the ectoplasm became vacuolated and ciliated. By the action of the cilia the eggs often rotated rapidly in the water. In the largest fusion-masses cilia appeared only on restricted areas.

Certain of the phenomena of ontogeny are thus shown to be independent of cell-division. It may be expected that further study of the material and careful analysis of the results will aid in the understanding of the mechanism of the earliest phenomena of development.

In conclusion, acknowledgment was made to the aid received from the subsequent work of A. D. Mead and Jacques Loeb.

*The Rate of Growth in Marine Invertebrata:* A. D. MEAD.

*Ingestion and Digestion in Hydra:* ELLIOT R. DOWNING.

Many observers have noted that the mouth of hydra is capable of great expansion, so that it can swallow comparatively large animals. The mouth is not a simple circular orifice; a cleft runs out from the center of the peristome toward each arm, so that it is divided into as many lobes as there are arms, the lobes alternating with the arms. The circumference of the expanded mouth is therefore as great as the contour of this radiate figure. These lobes at the margin of the peristome are double the thickness of the ordinary body wall on account of the greatly increased length of their endoderm cell. They become thinner toward the mouth and also where they merge into the body wall below the level of the tentacles. They are trav-

ersed by longitudinal muscle fibers continued from the body wall.

Ingestion is followed promptly by digestive processes. Within a few minutes after ingestion certain gland cells become apparent in the endoderm. These cells contain a nucleus which rapidly enlarges and becomes granular. As noted in the digestive processes of higher animals, these cells are probably forming enzymes. They rapidly decrease and finally disappear as the ferment is discharged into the body cavity. These gland cells stain best with gentian violet after osmic-Merkel.

The digestive process is rapid. Last June I observed a good-sized hydra ingest a young carp 8 mm. long. Seven hours later, as determined by sectioning, no trace of this remained in the digestive cavity. The digested material is absorbed by the endoderm cells, which after a meal are gorged with food spheres; much of this material, especially the oil, is passed on to the ectoderm cells, where it is stored. The fatty substance accumulated at the periphery of these cells forms a layer of droplets which may be stained an intense black by osmic acid. It is these fat droplets which during life give to hydra its brown color.

*The History of the Eye of the Blind Fish Amblyopsis:* CARL H. EIGENMANN.

The history of the eye of *Amblyopsis* may be divided into four periods:

(a) The first extends from the appearance of the eye till the embryo is 4.5 mm. long. This period is characterized by a normal palingenic development, except that cell division is retarded and there is very little growth.

(b) The second period extends till the fish is 10 mm. long. It is characterized by the direct development of the eye from the normal embryonic stage reached in the first period to the highest stage reached by the *Amblyopsis* eye.