

SUMMARY.

1. The complex nervous system produced in the budding process arises either (1) from the cells of the nerve cord, or (2, and chiefly) from ectodermic ingrowths.

2. There are five regions in the ectoderm which may give rise to nervous elements: (1) a single median ventral region (1, Fig. 1) especially active in producing the median portion of the cord in the new segments of the anterior zoöid; (2) a region, on either side, superficial to the latero-dorsal muscle band (3, Fig. 1), which produces the brain in the posterior zoöid; and (3) a region on each side, superficial to the latero-ventral muscle band (2, Fig. 1), concerned in the development of the sub-pharyngeal ganglia.

3. The brain arises in the region immediately contiguous to the lateral line cells; and the ectodermic ingrowths marking the point where the connective re-enters the body cavity from its position superficial to the muscle band appear in connection with these cells. If the cells of the lateral line are nervous, they are thus brought into relation, in an interesting way, with the central nervous system. The brain, in this event, is developed in connection with the lateral line cells, while the ventral cord is derived from elements much more ventral.

EPIDERMAL ORGANS OF PHASCOLOSOMA GOULDII.

By MARGARET L. NICKERSON.

Scattered abundantly over the introvert and body of this worm are found the epidermal organs which on the introvert have the form of papillæ, while on the trunk they are partially included in the large excavations on the inner surface of the cuticula. These bodies are ovoidal in shape with the smaller end directed outward, while the large base rests upon the circular muscle. Each is surrounded by a delicate membrane which is probably an invagination of the membrana propria.

The following is a summary of the results obtained from a study of these bodies.

1. The sensory nervous system of *Phascolosoma gouldii* is to be found entirely in the epidermal organs distributed abundantly throughout the body of the worm and the nerve fibers connecting them with the central nervous system.

2. These epidermal bodies may be grouped into four classes, two of which contain gland cells, the other two being non-glandular. The two types of glandular organs may be readily distinguished by the presence or absence of intracellular canals in the gland cells, while the two types of non-glandular organs are to be distinguished by the possession in one case of a bulb-like structure projecting above the general level of the cuticula.

3. All four classes of the epidermal organs possess sensory cells.

4. Nerve fibers are never found in continuity with the gland cells of either type of glandular organ, as has been several times asserted by different investigators.

5. The sensory cells of all these organs are bipolar, the cell body in the non-glandular organs being larger than that in the glandular organs.

6. Each of the peripheral processes of the sensory cells ends in a delicate sensory hair which in some cases at least is prolonged beyond the surface of the cuticula. In one case only, the glandular organs of the first type, the exact form of the peripheral ending was not made out.

7. The central processes of all these sensory cells enter the large nerves passing to the ventral nerve cord.

8. One type of glandular organ possesses a remarkable structure consisting of a communicating set of intracellular canals, each canal leading from an otherwise closed pouch. This pouch is surrounded by a zone of radiating threads. All these communicating canals finally open to the surface through a common duct.

9. The intracellular sacks belonging to this type of glandular organ are reservoirs for the secretion from the gland cells

and show much variation in size and appearance in correspondence with the phases of activity of these cells. The ducts from these sacks are the channels by which the secretion is conveyed to the surface of the animal. The radiating threads surrounding the sacks are probably continuations of the reticulum of the cytoplasm.

THE HISTOLOGICAL STRUCTURE OF THE EYES OF CUBOMEDUSÆ.

By EDWARD W. BERGER.

While in Jamaica with the Johns Hopkins Marine Laboratory, during the summer of 1897, Dr. Conant preserved material and tried experiments for the purpose of continuing his research on the Cubomedusæ, begun the year previous and now published as his thesis by the University. Upon the unfortunate death of Dr. Conant this material and notes were placed in the present writer's hands by Dr. Brooks. It is intended in the following paper to give only the principal results obtained by a careful study on the histology of the eyes of these medusæ, leaving their fuller discussion, together with Conant's physiological notes, for a more complete paper. The present work was done wholly on *Charybdea xaymacana*, while Conant's own work was in part done on *Tripedalia*.

For a complete description of the anatomy of the Cubomedusæ Dr. Conant's thesis, "The Cubomedusæ," or the "Johns Hopkins University Circulars," No. 132, November, 1897, should be consulted.

Roughly speaking, the Cubomedusæ, as the name implies, are cubes with their tentacles (four in *Charybdea* but twelve in *Tripedalia*) arranged at the four corners of the lower face of the cube. These tentacles are said to lie in the interradii. Half way between any two points of attachment of the pedalia (the basal portions of the tentacles) and a little above the lower margin of the bell, hang the sensory clubs, one on each side,