

Nerve Elements of the Embryonic Lobster.

By

Edgar J. Allen, B.Sc.Lond.

AFTER repeated trials with dilute solutions of methylene blue upon larvæ and embryos of a number of the smaller decapod crustacea, a favourable object for the study of the nervous system was at last found in the embryo of the common lobster. The embryos of this animal are specially advantageous on account of their large size, which enables them to be readily manipulated without much damage being done to their tissues, and also on account of the large size of the individual nerve elements.

In order to expose the ganglionic cord in the thorax, it is only necessary to break the yolk with needles and carefully remove it. If the embryo thus prepared be placed with the dorsal surface of the cord uppermost in a dilute solution of methylene blue in sea water (1 : 50,000 or 1 : 100,000), staining of one or more nerve elements takes place.

By practising this method upon a large number of embryos at various stages of development, staining of the following elements has been obtained :

1. Elements starting from cells in the brain or anterior thoracic ganglia, and giving off fibres which can be traced throughout the length of the ganglionic cord to the sixth abdominal ganglion. The fibres of some of these elements pass down the cord upon the same side as that on which the cell is situated, whilst others decussate and pass down upon the opposite side. Many of the fibres give off collateral branches to the neuropile of each ganglion through which they pass. One pair of fibres belonging to this group are the so-called giant fibres. They possess a diameter many times greater than any other fibre in the cord, and start from a cell which lies on the ventral surface of the brain. In the sixth abdominal ganglion these fibres break up into a number of smaller branches.

2. Elements originating in a cell in one of the ganglia of the cord, from which a fibre is given off, which after decussation with its

fellow of the opposite side runs forwards along the cord, and can be traced to the anterior part of the brain, where it ends by breaking up into fine branches.

3. Elements starting from a cell in one ganglion and giving off a fibre which, after sending a number of arborescent branches to the neuropile of that ganglion, ends in a small tuft of fine branches in the ganglion next behind.

4. Elements starting from a cell in one ganglion giving off a fibre which sends out lateral branches to the neuropile of the ganglion, passes forwards to the next ganglion, where it gives off a lateral tuft of branches, and ends also in a tuft of branches in the next ganglion, but one in front of that in which the cell lay. The terminal tuft lies close to the lateral tuft of the element of the next ganglion, and directly opposite the terminal tuft of an element of group 3.

5. Elements starting from a cell in a ganglion, giving off a fibre, which passes through one of the lateral nerves of the cord, and finally breaks up upon a muscle. A considerable number of elements of this type can be distinguished, and these are repeated in successive ganglia. They must be regarded as motor elements.

6. Elements originating in a cell which lies in the dorsal ectoderm of the abdomen—therefore entirely outside the ganglionic cord,—and gives off a fibre which eventually enters one of the abdominal ganglia, where it bifurcates, sending one branch forwards towards the brain, whilst the other passes backwards through the posterior ganglia. These elements are probably sensory in nature.

A full account of these observations, with figures, has appeared in the Quarterly Journal of Microscopical Science.