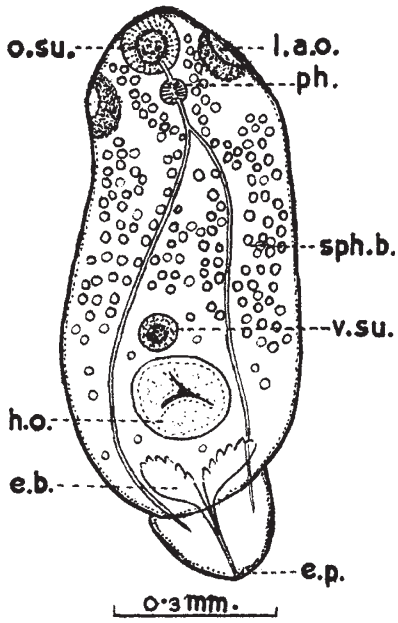

Diplostomulum truttæ n.sp., showing body structures

This metacercaria is widely distributed in Scotland.

It is with great pleasure that I thank Prof. James Ritchie for providing me with facilities to carry out this investigation in the University of Edinburgh.

M. B. Lal

Department of Zoology,
University, Lucknow.

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Growth and Axon Formation in the Midbrain of the Chicken Embryo

In the development of anterior horn cells, Hydén[1] recognizes three successive phases. The first is one of intensive growth without axon formation. In the second, growth is diminished, but axon formation occurs. In the third phase, growth is again intensive and associated with continued axon formation. The resulting peripheral axon can, in the adult, be regenerated by a 'revival' of this stage.

It is thus of interest to inquire whether equivalent phases occur in the development of nerve cells the axons of which remain within the central nervous system and which cannot regenerate. In the chicken embryo, such cells are found in the dorsal region of the midbrain vesicle which contributes to the corpora bigemina, and observations have been made on this region.

As in other parts of the central nervous system, axon formation cannot be demonstrated in the cells of the ependymal layer; but, in the earlier stages of development, these cells grow and divide rapidly and correspond to the first phase. However, when cells pass from the ependymal to the mantle layer, axon formation occurs. The developing axons accumulate in the more peripheral marginal layer, the width of which is, for a time, an indication of the amount of axon material formed by the mantle cells immediately underlying any particular region. Although this relationship becomes modified by the ingrowth and outgrowth of axons, the modification is not important before the eighth day of incubation. Hoadley[2] transplanted the three-day midbrain on to the chorio-allantoic membrane and, five days later, found that, although smaller than the controls, the transplanted midbrains had a normal architecture, achieved in the absence of ingrowing or outgrowing axons.

Since cell division does not occur in mantle cells, these would conform to the second phase if, while a significant amount of axon formation took place, there was little or no increase in cell size. The average volume of the cells was determined by counting the nuclei in measured areas of histological sections of known thickness. It was found that the volume of the mantle cells did not vary by more than ± 10 per cent in the period 3–8 days of incubation, although measurements of the diameters of the midbrain indicated an increase in its volume of more than a hundred times. In the same period the non-nucleated axon-containing layers increased from 2 to 40 per cent of the total width of the midbrain wall. Hence, in the period 3–8 days of incubation, mantle cells form axon material equivalent to about 40 per cent of their bulk without increasing in size, and thus conform to the second phase described in the development of anterior horn cells.

During the 3–8 day period, growth of the midbrain as a whole must be due to growth and division of cells in the ependymal layer. However, dividing cells disappear from this layer after the eighth day of incubation, so that subsequent growth of the midbrain can be assumed to require increase in size of individual cells. Further, these cells must continue to form axon material in order to make and maintain connexions with other parts of the central nervous system—a combination of growth and axon formation similar to that described above in the third developmental phase. Thus, the three phases occurring in the development of the anterior horn cells have their equivalent in the development of the cells of the midbrain, which, in contrast to the anterior horn cells, produce axons that do not leave the central nervous system and which are incapable of regeneration.

R. J. O'Connor

Westminster School of Medicine,
London, S.W.1.
June 30.

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Neurosecretory Pathways in the Prawn, *Leander serratus*

Last year, I reported the presence of neurosecretory cells within the tritocerebral commissure of *Penæus braziliensis*, and the distribution of fuchsinophil droplets along the course of two post-commissure nerves[1]. Two flat extensions of these nerves, adjoining blood sinuses and therefore described as sinus-plates, were full of these droplets. Injection experiments showed that those regions with the most droplets yielded the most potent extracts when these were tested by their effects on the white chromatophores. The sinus-plates resemble the sinus-glands of the Mysidacea[2], and this parallel has been made