FURTHER OBSERVATIONS ON HELICOTYLENCHUS VULGARIS YUEN

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The oval-shaped nuclei surrounding the oesophagus and glands and in the ventral hypodermal chord of H. vulgaris seem to be nuclei of the hypodermal cells and not nerve nuclei. The oesophageal glands do not envelop the intestine except perhaps at the oesophago-intestinal junction.

Three larval stages of H. vulgaris were found and are best characterised by the structures of the genital primordium which consists of 4 cells in L2, 12 in L3 and 84 in L4. The structure of the genital primordium remained unchanged between moults and the length of the genital primordium did not overlap between stages. Specimens ensheathed in moulted cuticles possess the genital primordium of the next stage.

The following study of the development of Helicotylenchus vulgaris is concerned mainly with the morphology of the larval gonad, which has not been described in any member of the Hoplolaiminae. Other features of the post-embryonic development were studied by Golden (1956) in Rotylenchus buxophilus (Golden) in Helicotylenchus microlobus Perry and by Zuckerman & Strich-Harari (1964) in H. multicinctus (Cobb). Because van Weerdt (1960), Hirschmann (1962) and Anderson & Darling (1964) reported that “specialised ventral chord nuclei” are concerned in the formation of the vagina, the nuclei in the hypodermis were studied which in turn led to a study of the relative position of the oesophageal glands and intestine.

MATERIALS AND METHODS

H. vulgaris was collected from Broadbalk Wilderness. Most specimens were fixed either in T.A.F. or F.A. 4 : 1, stained in acetic orcein and processed to glycerine by the slow method (Goodey, 1963), but Seinhorst’s solution I (Seinhorst, 1959) was often used instead. At room temperature whole specimens usually required several days to become fully stained. The acetic orcein solution decomposed on long standing. Specimens were then first rinsed in the glycerine mixture before they were transferred to fresh solution for dehydration. Staining happened quicker at 45-55° C, but the outlines of the nuclei became diffuse.

The intra-vitam stain prepared with methylene blue and rongalite (Pantin, 1948) and the lead-haematoxylin-acid fuchsin stain (Gurr, 1956) supposed to stain nervous tissues were also used, but both stained the same tissues as acetic orcein.

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Hand sections were prepared from cut lengths of nematodes stained in acetic orcein or cotton blue in lactophenol (Franklin & Goodey, J. B., 1949) and dehydrated by the slow method to pure glycerine. Acetic orcein differentiated nuclei but cotton blue in lactophenol made the outlines of the oesophageal glands more distinct.

RESULTS

Hypodermal nuclei

The elongate hypodermal nuclei were distributed similarly in larvae and adults (Fig. 1, A & 3, A-C). Four hypodermal chords could be distinguished: one dorsal, two lateral and one ventral; all four were nucleated from the spear base rearwards. The lateral chords were most conspicuous and each contained a lateral row and two sublateral rows of nuclei. In the oesophageal region both the dorsal and ventral chords seem to contain three rows of nuclei each (Fig. 1, b) but this could not be determined with certainty. The dorsal chord became anucleate near the position of the nucleus of the dorsal oesophageal gland. In the ventral chord the elongate nuclei were replaced by a row of oval-shaped nuclei, and I am not certain whether these were nuclei of the hypodermal cells.

Nuclei surrounding the oesophagus and glands, in the ventral hypodermal chord and at the anal region

In addition to the hypodermal chord nuclei, oval-shaped nuclei with similar staining properties were observed surrounding the anterior and posterior ends of the median bulb and the anterior half of the oesophageal glands (Fig. 1, A & 3, A-C). In thick transverse sections these oval-shaped nuclei seemed to be inside the hypodermal chords. The number and arrangements of the nuclei at both ends of the median bulb were similar (Fig. 1, A). Posterior to the nerve-ring many more nuclei lay laterally than dorsally or ventrally to the oesophageal glands (Fig. 1, f). Sections of the anterior and posterior ends mounted in ventral view showed that the oval-shaped nuclei in the ventral hypodermal chord arose from the ventral group of nuclei surrounding the oesophageal glands and ended in another group of oval-shaped nuclei at the anal region (Fig. 3, A-C). Between the oesophageal glands and the anus the nuclei in the ventral chord were arranged in a single row except in the vulval region where they were distributed differently in the different growth stages. In L₂ they were mostly arranged in a single row but one or two nuclei might be paired (Fig. 4, D). In L₃ the sixteen nuclei nearest the genital primordium tended to be arranged in pairs in two groups of eight on either side of the mid-point of the genital primordium (Fig. 4, E). In L₄ the nuclei in the vulval region were arranged much as in L₃ but they were apparently connected anteriorly and posteriorly along the median line with a circle of four cells surrounding the future vulval opening (Fig. 4, F & G). Distribution of the nuclei in the vulval region of the adults was not studied.