

## ANATOMIC, HISTOLOGIC AND CYTOLOGIC STUDIES OF MEMBERS OF THE ORDER CHROMADORIDA

by

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### SUMMARY

In 91 species belonging to the nematode order Chromadorida the anatomic, histologic and cytologic organisation of the functional systems (body wall, digestive tract, nervous system, reproductive systems) are analysed.

The Chromadorid cuticle is three-layered. The middle layer (matrix) is a hollow space, containing a skeleton, which causes the punctuation-pattern. Three main types of skeleton are discerned, and a survey of the structural variations is given. In the Chromadoridae the matrical organisation of the juvenile cuticle is uniform, but usually a more elaborate type of skeleton is formed during the last moult. Analysis of the punctuation-patterns in adult Chromadoridae revealed, that the different types are structurally only gradually different. A functional analysis of the cuticular architecture is given, in which a relation with the muscle structure is pointed out. A hypothesis concerning the hypermorphosis of the cuticle in the Chromadoridae is brought forward.

The epidermis contains epithelial cells and two types of gland cells, the secretory cycles of which are described at the ultrastructural level. These glands are associated with neural elements. The caudal glands and the ventral gland are specialised sub-epithelial glands of the same type. The cytological features and the secretory mechanism are identical. The ventral gland is accompanied by coelomocytes, which are thought to function in the elimination of substances from the pseudocoelom.

Comparative morphology of the stoma revealed a structural uniformity, except for the Comesomatidae. The stomatal apparatus consists of two functional systems: a dilatation mechanism of the cheilostoma and an operating mechanism of the dentition. The dilatation mechanism depends on the hydrostatic properties of a labial ventricle and the transformation of longitudinally directed into radial forces, in which the rugae play an important role. The muscular systems are divided in an intra- and an extra-oesophageal group. In *Chromadora nudicapitata* the intra-oesophageal group consists of direct and indirect tooth muscles, which open the oesophagostoma and erect the teeth. The extra-oesophageal muscles comprises 4 sets of muscles (protractors, retractors, indirect dilatatores buccae and a sphincter).

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In the stomatal armature two types of teeth are discerned. The concept onchium is redefined as a cuticularisation, which is incorporated into the stomatal wall during the moult following its formation. The nature of the stomatal dentition is analysed in the different subfamilies of the order.

The cellular organisation of the oesophagus of *C. nudicapitata* is reconstructed by serial sections at the ultrastructural level. 17 muscle cells, 51 marginal cells, 8 neurocytes, 5 gland cells and 2 cells of unknown nature have been located. Comparative morphology indicates, that the bulbar anatomy in the Chromadoridae is invariant, the structural differences being insignificant and of secondary origin.

The intestinal cells are characterised and their possible functions discussed. The structure of the rectum is described. In the Choniolaimidae and the Selachinematidae the rectum is not functional.

The nervous system of *C. nudicapitata* is reconstructed at the ultrastructural level. 72 ganglion cells have been identified. They form the circum-oesophageal ganglia (frontal, lateral and posterior ganglia), the postoesophageal ganglia and the peri-anal ganglia (preanal and lumbar ganglia). In addition, 20-30 isolated bipolar neurocytes are present in the epidermis. The cephalic nerves comprise 8 intra-epithelial nerve trunks (median, lateral and submedian) and 4 submedian nerve trunks in the pseudocoelom. The ramifications and the commissures of these trunks are given in detail. The nervous system of the midbody is located in the epidermis (median, lateral and submedian). There are 6 caudal nerve trunks (median, lateral and laterodorsal). The histology of receptor-organs is described in detail (labial papillae, cephalic setae, amphid, amphidule, body pores, somatic setae, ocelli). Neurosecretory activity is detected in about 20 ganglion cells, the significance of which is discussed.

Comparative study of the female reproductive system shows a common basic anatomy (ovary, oviduct, compartmented uterus, cuticularised vagina) with structural variation in the histology of the oviduct, the compartmentation of the uterus, the structure and composition of the spiral valves and the presence of three different types of glands. In the male reproductive system the variation occurs in the number of testes, the structure of the full-grown vesicula seminalis, the presence of an uterus masculinus, the structure of the valves, the number of ejaculatory glands and the structure of the copulatory apparatus. The main characters of the spicular sclerotisations are depicted, which are related to the structure of the spicular musculature. The histology of the vas deferens is highly variable; it is assumed, that the variations are related to the development and productivity of the testes.

Comparative morphology of the stomata revealed a structural similarity, except for the Chromadoridae. The stomatal apparatus consists of two functional systems: a distal mechanism of the distal part and an operating mechanism of a dentition. The distal mechanism depends on the hydrostatic properties of a labial ventricle and the transmission of longitudinally directed lateral force. In which the force acts an important role. The muscular system is divided in an intra- and an extra-oesophageal group. In Chromadoridae the intra-oesophageal group consists of three and in other taxa of two muscles, which open the oesophagus and close the teeth. The extra-oesophageal muscles comprise 4 sets of muscles (protractor, retractor, indirect distator, inductor and a sphincter).