Chapter 10

CHILOPODA – ENDOCRINE SYSTEM

Jörg Rosenberg, Carsten H. G. Müller & Gero Hilken

Studies on structure and function of the endocrine system, and the hormonal control on moulting and gametogenesis, are essentially limited to anamorphic and adult stages of Lithobius forficatus (reviewed in Juberthie-Jupeau, 1983; Joly and Descamps, 1988; Descamps, 1990).

Anatomy and fine structure of the endocrine system

Neurosecretory cells in the brain

In all centipede groups, neurosecretory cells (Fig. 10.2A) are chiefly located in the protocerebrum (Gabe, 1952, 1953a, 1956, 1966; Palm, 1956; Scheffel, 1961; Joly, 1966c; Joly and Descamps, 1968; Ernst, 1971; Jamault-Navarro and Joly, 1977; reviewed in Juberthie-Jupeau, 1983). These cells form paired groups in the anterior-lateral area of the frontal lobe and in the posterior-dorsal areas of the pars intercerebralis.

In L. forficatus, most of the axons of the neurosecretory centres from the frontal lobe (type A, B1-2, C) and some axons of the pars intercerebralis (type B3-5) form the nerve of the cerebral gland (nervus glandulae cerebralis) (Fig. 10.1A).

Several other pathways, with axons poor in secretory granules, issue from neurosecretory cells of the frontal lobe and the pars intercerebralis and innervate areas of the brain or branches of the cephalic arteries (Jamault-Navarro and Joly, 1977; Jamault-Navarro, 1981).

Activity of the neurosecretory cells is first detected during the second anamorphic larval stadium shortly before ecdysis (age 10-12 d) (Scheffel, 1961). In Geophilus flavus, the nerve of the cerebral gland is formed by axons of the neurosecretory cells of the frontal lobe and the pars intercerebralis (Ernst, 1971).

Seven types of neurosecretory cells with different neurosecretory granules (type A, B1-5, C) can be distinguished in L. forficatus (Fig. 10.1A) and G. flavus (Ernst, 1971; Jamault-Navarro and Joly, 1977; Jamault-Navarro, 1981).
Neurosecretory cells in the ventral nerve cord

In *Scutigera coleoptrata* neurosecretory cells are observed in both the cranial and caudal part of the ganglia (Prunesco, 1970a).

In *L. forficatus*, neurosecretory cells are observable within the suboesophageal ganglion, the forcipular ganglion, and in the ganglia of the ventral nerve cord. Paired groups of neurosecretory cells are developed in the anterior and in the posterior region of each ganglion. Neurosecretory axons innervate the dorsal heart nerve via the segmental heart nerve (Scheffel, 1969). Activity of the posterior neurosecretory cells of the ventral ganglia is first detected during the III larval stadium, whereas the activity of other neurosecretory cells is only observed in older larvae (Scheffel, 1961). Prunesco (1970b) described histologically anterior and posterior neurosecretory areas within the ganglia of the nerve cord of *Scolopendra cingulata* and *Plutonium zwierleini*, with three types of neurosecretory cells. In *G. flavus* neurosecretory cells (type A, B, C) are situated near the origin of the segmental heart nerve. Neurosecretory axons innervate the segmental pericardial organs and the dorsal heart nerve (Fig. 10.1C). Sporadically neurosecretory cells (type C) are observable in the anterior part of the ganglia. In the ganglion of the hind extremity, axons of the anterior neurosecretory cells run into the previous ganglion and innervate the heart. Neurosecretory cells are absent within the ganglia of the first and second genital segment (Ernst, 1971).

Neurohemal organs

Neurohemal organs were only investigated in *L. forficatus* (Jamault-Navarro, 1984) and *G. flavus* (Ernst, 1971).

In *L. forficatus* cephalic neurohemal organs consist of dilated neurosecretory axons with numerous secretory granules near the walls of the aorta and antennal arteries (Fig. 10.1B). The axons can be differentiated according to their different types of neurosecretory granules originating from the neurosecretory areas of the pars intercerebralis.

In *G. flavus*, segmental neurohemal organs are situated along the heart in the region of the ostia. These pericardial organs are innervated by the posterior neurosecretory cells of the ventral nerve cord ganglia via the segmental heart nerve (Fig. 10.1C).

The neurosecretory axons contain different types of granules (type A, B, C). Most axons remain in the pericardial organs, fewer of innervating the dorsal heart nerve (Ernst, 1971).