ABSTRACT

Immunocytochemical methods using an antibody raised against serotonin (5-HT) were used to identify presumptive serotonergic structures in the ventral nerve cord of Palaemonetes mesogenitor. Every segmental thoracic ganglion contains one pair of labelled neurons. Immunoreactive fibres are arranged in three pairs of rostro-caudal bundles: the medial fibre bundles (MFB) and the lateral fibre bundles (LFB) run longitudinally through the entire thoracic and abdominal nerve cord; the central fibre bundles (CFB) extend only between the second and the fourth thoracic ganglia. These results are discussed and compared with the descriptions from lobster by Beltz & Kravitz (1987) and from crayfish by Real & Czternasty (1990).

RÉSUMÉ


INTRODUCTION

Serotonin (5-Hydroxytryptamine: 5-HT) and other aminergic transmitters are involved in behaviour and a wide range of functions in invertebrates. Crustaceans like crayfishes, crabs, lobsters, and isopods, have provided particularly enlightening material to demonstrate the role of serotonin in the modulation of behaviour and its underlying action on the synaptic junctions.
5-HT, which appears precociously during development, influences the growth of the olfactory and accessory lobes during embryogenesis (Beltz et al., 1992).

Huber et al. (1997b) show important increases in the levels of fighting activity and aggression in subordinate lobsters and crayfish following injections of serotonin. Furthermore, Huber et al. (1997a) have observed that serotonin is converted in metabolites as serotonin-O-SO₄ which are removed by excretory glands and excreted in the urine. They suggest that, these amine-metabolites being biologically active, they might be used in communication between lobsters.

This amine is widely distributed in the pericardiac organs and has an indirect cardio-excitatory role (Cooke & Sullivan, 1982; Berlind & Cooke, 1970). Those organs receive the serotonergic fibres dorsally from the second motor roots of segmentary nerves of thoracic ganglia (Morganelli & Sherman, 1987). 5-HT may exert its acceleratory action by depolarizing the small cells of the cardiac ganglion which have been considered the pacemakers of the system (Berlind, 1998).

Indirect hyperglycemic action was also demonstrated in many crustaceans (Keller & Beyer, 1968; Stroenberg & van Herp, 1977; Martin, 1978; Gorgels-Kallen, 1985; Lüschen et al., 1993).

This amine also has a role in regulating reproductive hormone release and gonadal maturation in decapods (Fingerman, 1997).

The distribution of 5-HT-like containing cells in the central nervous system was demonstrated with different methods, and mapping of 5-HT immunoreactive structures was described in many crustaceans as in the lobster Homarus americanus H. Milne Edwards, 1837 by Beltz & Kravitz (1987), in the crayfish Procambarus clarkii (Girard, 1852) by Real & Czternasty (1990), in isopods by Martin (1988) and Thompson et al. (1994). In the crayfish Cherax, serotonin immunoreactive structures are described in the brain (Sandeman & Sandeman, 1987): one pair of neurons, called giant neurons are connected with the olfactory and accessory deutocerebral lobes. The pathway of these giant serotonin-immunoreactive neurons has been studied by electrical stimulations (Sandeman & Sandeman, 1994).

The distribution of this amine was examined in the adult lobster brain, too (Langworthy et al., 1997). It is widely located, both in the proto-, deuto-, and tritocerebrum.

This attempt is focused on the serotonin-containing neurons in the ventral nerve cord of the shrimp Palaemonetes mesogenitor Sollaud, 1912, an endemic species of southern Tunisia. The pattern of the presumptive serotonergic neurons and fibres has been compared with that in other decapod Crustacea.

**MATERIAL AND METHODS**

Animals were caught in fresh water in south Tunisia and kept in aerated freshwater tanks. They were kept at room temperature and normal photoperiod,