NOTE ON SOME ANATOMICAL FEATURES (NEUROSECRETORY ORGANS AND MEDIAN OCELLI) OF *PARAMPHISOPUS PALUSTRIS* (GLAUERT, 1924) (ISOPODA, PHREATOICIDAE)

BY

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ABSTRACT

Previous studies of the endocrine organs and frontomedial ocelli of the Isopoda revealed that structural differences exist in the hitherto observed suborders. The Phreatoicidea, the oldest known suborder, are studied for the first time. A Bellonci organ was not discovered. The sinus gland has a globular form, it seems to be linked with the lateral cephalic nerve plexus. Similar sinus glands are known from the Oniscidea. The median ocelli are reduced to the number of 3, while other Isopoda may have 2 to maximally 5 ocelli.

INTRODUCTION

The Phreatoicidea Stebbing, 1893, are not only the oldest isopods hitherto discovered as fossils (Schram, 1970, 1982), but also the isopods with most plesiomorphic features, being the sister group of all remaining suborders of the Isopoda (Wägele, in press). Typical primitive characters are the medial filter setae on the sympod of the second maxilla, an old peracarid feature (Nicholls, 1943) which is absent in the remaining isopods. The stomach has a primitive structure with straight anterior filters (Wägele, in press); only the Asellota have a similar stomodeal morphology. Present-day distribution is a third indication of the age of this group: recent Phreatoicidea are Gondwana relicts of freshwater populations dispersed by continental drift and surviving in Australia, Tasmania, New Zealand, South Africa and India (Knott, 1986). Carboniferous and later fossils are known from marine deposits in Eurasia and North America. It is to be expected that some anatomical features of the phreatoicid nervous system could be more primitive than in the hitherto
studied isopods. In this paper we will focus on the aspect of the ocelli, the sinus gland (SG) and on the relationships between the SG and the Y-organ.

MATERIAL AND METHODS

Habitat. — Paramphisopus palustris (Glauert, 1924) is a phreatoicid living in freshwater swamps. Animals came from the northern suburbs of Perth, Western Australia (31°51'S 114°45'E), some 600 meters from the Indian Ocean; they feed on submerged macrophytes (Buffalo grass) and they have been caught by sweeping the submerged plants with a hand net. During the drought animals oversummer in moist mud.

Methods. — Heads were fixed during two hours in chilled 3% glutaraldehyde in 0.1 M phosphate buffer (pH 7.3). Osmolarity was adjusted to 650 m Osm with NaCl and sucrose. After two washes (2 x 1h) in buffer plus sucrose, a one-hour post fixation in 1% OsO₄ in phosphate buffer was done at room temperature. Spurr was used as embedding medium. Thin and ultrathin sections were cut with a Reichert OMU3 ultramicrotome; organs were identified and located under a light microscope with 1 μm serial sections stained with toluidine blue. Ultrathin sections, mounted on bare grids, stained with uranyl acetate and lead citrate, were examined with a JEOL 100 C electron microscope.

I. The ocelli

a) Localization of the ocelli. — Intercerebral median ocelli exist in most groups of Isopods (Martin, 1971, 1978a and b), but so far the Phreatoicidea have not been checked. The 3 small photoreceptors, tear drop in shape (maximum length 30 μm and 10 μm wide) and without dioptric apparatus, are located in the median part of the protocerebrum; 2 ocelli are located on the dorsal side of the brain some 15-20 μm on each side from the symmetry plane. The third one, on the ventral side of the brain, 250 μm beneath the 2 others, is single and very close (100 μm in average) to the frontal head capsule (fig. 1).

b) Ultrastructure. — Each photoreceptor consists of 2 retinular cells (fig. 2) and displays a very small rhabdom, which is triangular in cross section. Retinular cells are stretched (30 μm length, 10 μm wide), they show a nucleus with irregular shape and denser lumps of chromatine than in the surrounding nuclei of the brain. Cells are linked by desmosomes on the edge of the fused rhabdom. The microvilli are rather short (2 μm long) and packed according to 2 preferential plans. The cytoplasm of the receptor cell exhibits some mitochondria and scarce multivesicular bodies. Rare dark granules are probably last remnants of screening pigment. In the rhabdom area the cytoplasm is filled with bulging smooth ER-membranes.