Int. J. Insect Morphol. & Embryol., Vol. 16, No. 2, pp. 99 to 119, 1987.
Printed in Great Britain.

0020-7322/87 $3.00 + .00

ULTRASTRUCTURE OF THE MALPIGHIAN TUBULES OF *ONYMACRIS PLANA PLANA* PERINGUEY (COLEOPTERA : TENEBRIONIDAE)

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(*Accepted* 6 *October* 1986)

Abstract—The structure of the free segment of the malpighian tubules of *Onymacris plana plana* Peringuey (Coleoptera : Tenebrionidae) has been examined to complement observations on tubule activity (Nicolson and Hanrahan, 1986). *O. plana* lives in arid conditions in the Namib desert and may be subject to periods of desiccation and to fogs when humidity is high. Cell structure of malpighian tubules from the following were examined; beetles from the field, beetles kept in humid and arid laboratory conditions, *in vitro* tubule preparations treated with substances such as cAMP and corpora cardiaca extract. The free segment is composed of a longer yellow distal region and a shorter colourless proximal region. Type 1 and Type 2 cells were present in the distal region, the latter being few in number, irregular in shape, and relatively small. Type 1 cells varied in appearance when the tubules were exposed to different conditions. Laminate spheres were common in these cells when the beetles had been desiccated, either under laboratory or field conditions. Few were present in the tubules of insects kept in water balance. Exposure to dilute Ringer or cAMP caused the channels between the basal infoldings to widen. Exposure to extracts of brain or corpora cardiaca containing diuretic hormone did not have this effect. In dehydrated beetles, the laminate spheres did not disappear when the tubules were treated with diuretic hormone. Type 1 cell structure is influenced by the conditions that the beetle experiences.

Index descriptors (in addition to those in the title): Type 1 and Type 2 cells, laminate spheres, diuretic hormone, cAMP, desiccation.

INTRODUCTION

PRIMARY urine formation in insects results from a process of selective secretion carried out by the malpighian tubules. In spite of having a very simple basic organisation, i.e. a small number of cells arranged around a central lumen, malpighian tubules show considerable variation in structure and function among insects. Phillips (1981) has pointed out that to date the malpighian tubules of only a few insect species have been studied in detail. One insect group that has been virtually ignored is the Coleoptera (Maddrell, 1980). There are brief descriptions of tubule morphology (Shukla and Singh, 1969; Shukla and Verma, 1971) and microscopic structure (Miller, 1931; Auten, 1933; Gupta, 1965; Dunkel and Boush, 1968; MacGowan and Sikorowski, 1981), the latter being included with descriptions of gut structure. Only the cryptonephridial system of the mealworm, *Tenebrio,* has been examined in detail (Conet, 1934; Patton and Craig, 1939; Ramsay, 1964; Saini, 1964; Grimstone *et al.*, 1968; Byers, 1971a, b; Koefoed, 1971). The