

EFFECT OF MARBLE SLURRY ON MALPIGHIAN TUBULES OF *PERIPLANETA AMERICANA*

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ABSTRACT

Malpighian tubules are supposed to be excretory organs of the insect. It is typically long, slender and blind tube in the haemocoel. In the present study treatment of marble slurry powder was given to *Periplaneta americana* for different duration. The results show destruction of capsule wall of malpighian tubule and severe damage to peritoneal sheath. The nucleus of glandular epithelium is damaged and the effect is also observed on brush border of microvilli.

INTRODUCTION

The Malpighian tubules are supposed to be excretory organ of insect and in insects generally the posterior end of the midgut is delineated by the malpighian tubules. The malpighian tubules are typically long slender and blind tubes in the haemocoel, proximally at the common cement of the hindgut. A reticulum of fine tracheal tubes retains them in place. The malpighian tubules are almost universally present and vary in number. It is supposed to be concerned with water regulation and ionic balance of haemolymph. It varies in number from two in Coccidae to over one hundred and fifty in honey bee. They are absent in Collembola, Japyx and Aphididae. In most Mallophaga, Diptera, Thysanoptera, many bugs, larvae of Aphids, Vespidae, Formicidae the malpighian tubules are four, in Coleoptera usually four to six, in Lepidoptera six, in Pelcoptera thirty to fifty, in Blattids eighty to hundred, in Mantids about hundred, in Locustids hundred, in Acridids and in Odonata fifty to hundred and in Hymenoptera sixteen to hundred.

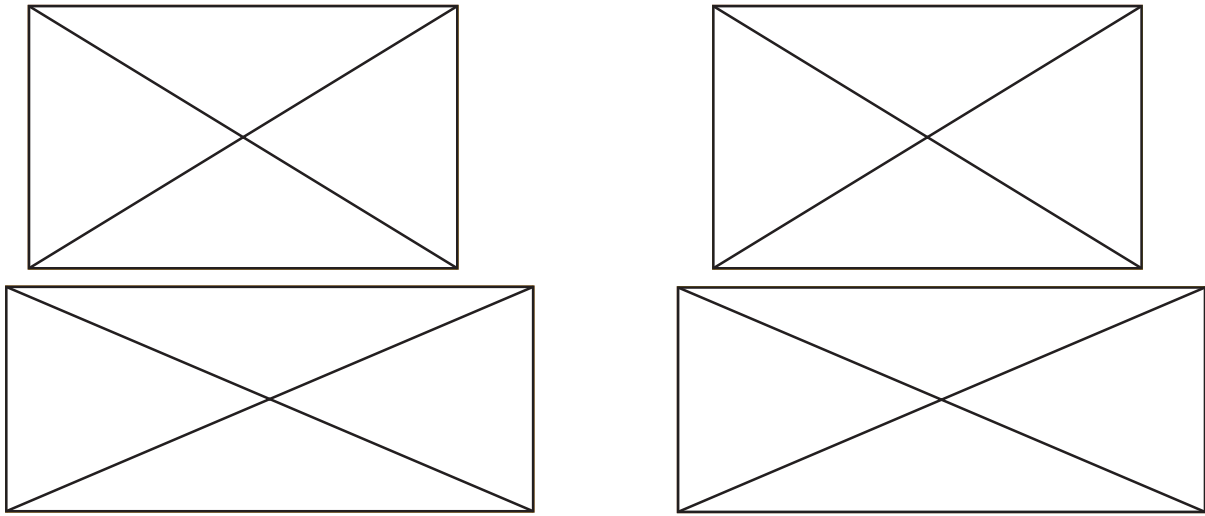
MATERIALS AND METHODS

The adults of *Periplaneta americana* were exposed to dry marble slurry spread in chamber with the help of air pump. The insects were exposed for 24 hours, 48 hours, 72 hours and 96 hours period. The insects were dissected after 24hrs, 48 hrs, 72 hrs and 96hrs and malpighian tubules were fixed in Bouin's fluid for 24 hrs. The tissue was embedded in histopathowax (60degree centigrade to 62 degree centigrade) and histowax (56 degree centigrade to 50 degree centigrade). Section were cut at 8micron and stained with haematoxyline and eosin.

RESULTS AND DICUSSION

The histological pictures of normal malpighian tubules shows that it consists of six large cuboidal epithelial cells enclosed in muscularized cuticle capsule. Each epithelial cell has nuclear and minor slide, lined by five microvilli making a fine brush border.

However with the treatment of slurry powder, the above picture starts deteriorating.



Photomicrograph of control & slurry powder treated transverse section of malpighian tubule of *P.americana*
A - Control ; B - Treatment with Marble slurry powder.

After 24 hrs of treatment, the basement membrane shows damage of various parts with others in normal state. After 48 hrs of treatment the effect is on structure with more damage to basement membrane and peritoneal sheath. The longitudinal muscles in this region also show damage. After 72 hrs of treatment there was further destruction in capsule wall. Peritoneal sheath was damaged severely with effect on glandular epithelium. Some deposition of slurry is seen. After 96 hrs of treatment the nucleus of glandular epithelium is damaged and the effect is also observed on brush border of the microvilli, with more deformation and lumen showing deformation.

Berridge (1966 b) studied the effect of temperature on the movement of malpighian tubules that the malpighian tubules of *Periplaneta americana* show 5 to 15 contractions per minute at 20 to 25 C. It has been stated that the movement increases with the increase in temperature and they reach to the maximum at 35 to 38 C. Some effect of sub lethal dose of insecticides have also been reported on the movement of malpighian tubules (Maddrell, 1969) Permeability studies carried out on tubules of *Glomeris* (Farquharson, 1973 c) suggest that there is little resistance to the movement of these substances across the tubule wall. It may also be significant that where only four amino acids could be detected in two way chromatograms of haemolymph, ten amino acids where obviously present in the fluid (Farquharson, 1972). Effective antidiuretic factor have been found to control secretion by insect malpighian tubules (Wall & Ralph, 1964; Cazal & Girardie 1968;

Vietinghoff, 1967). Similarly, it was observed that marble slurry changes the histology of malpighian tubules of *Periplaneta americana*. Therefore it concluded that the changes in malpighian tubules of *Periplaneta americana* has been due to deposition of marble slurry causing histological deformities. The functional and histological changes of *Periplaneta americana* are comparable to changes reported by Berridge (1966), Maddrell, (1969), Farquharson, (1972).

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