The Malpighian Tubules.

The Malpighian tubules first make their appearance at the age of 28-hours. They arise as ectodermal evaginations from the proctodaeal wall very close to its blind end (Plate 3, Fig. 17, mt). They rapidly elongate as blind tubes and are soon thrown into folds so that their actual extent could not be determined with certainty. Each tube in cross-section presents a circular appearance with a small lumen bounded by 4 or 5 cells. These cells possess large rounded nuclei. From the very beginning the lumen of the tubule is continuous with that of the proctodaeum.

Interesting cases of the development of Malpighian tubules before the formation of proctodaeum have been recorded by Nelson (1915) in Apis and by Carrière and Bürger (1897) in Chalicodoma. In the honey bee Nelson has observed four pit-like depressions at the extreme end of the germ band on the dorsal side of the egg. These rudiments of the Malpighian tubules appear before the ectodermal area included between them becomes depressed to form the proctodaeal invagination and for obvious reasons have been regarded as ectodermal in origin. While there is general agreement on the ectodermal nature of the Malpighian tubules, Henson (1932) has taken exception in regarding them as endodermal in origin. From his investigations on Pieris brassicae (Henson, 1932) he concludes that the functional part of the tubule is derived from the endodermal interstitial rings and it is only the lower part of the tubule, forming the common tube, that arises
from the wall of the proctodaeum. His later studies on Calliphora (Henson, 1945; quoted by Demerec, 1950) confirmed this view. Similar views are held by Demerec (1950) on Drosophila. In support of this view Henson (1932) has attempted to homologize the stomodaum and proctodaum of Pieris embryos with the oral and anal lips of the blastopore of Peripatus. Roomwal (1937) is not prepared to accept this mode of origin of the malpighian tubules and says in a foot-note:

"... The blastopore of Peripatus is formed simultaneously with the differentiation of the endo-mesoderm. The stomodaal and proctodaal invaginations of Pieris, on the other hand, appear long after the differentiation of the endo-mesoderm (inner layer). Consequently, the stomodaum and proctodaum and the malpighian tubules must be regarded as purely ectodermal."

In A. proxima the evidence thus far available goes to prove that these malpighian tubules are purely ectodermal structures.