

Wigglesworth (1953) quotes Aubertot (1934) as authority for saying that the PM of *Forficula* is added to by delamination from the midgut wall. Waterhouse (1954) also followed Aubertot in recognising this condition in the Dermaptera. However, he now feels that the evidence does not definitely point to the membrane being of double origin (personal communication).

Wigglesworth (1930, 1939) shows a fundamentally different method of formation of the tubular PM of *Forficula auricularia* from that in *Anisolabis littorea*. It is secreted, he says, by an anterior ring of cells as a viscous material. This is moulded into a homogeneous tube as it passes through an annular press having for its inner jaw the collar of the cardiac valve and for its outer the angle of the midgut wall where it turns forward to form the second fold. The outer jaw is held against the inner by the contraction of a circular muscle in the angle of the wall. This is the typical type II PM of Wigglesworth (1939 and later editions) and type I of Waterhouse (1953, 1953a, 1954) and Day and Waterhouse (1953). The nomenclature of the latter authors will be followed here, although the method of PM formation in *A. littorea* is not strictly the same as in *F. auricularia*. There is no functional press of this type in *A. littorea*, for the constrictor muscle is absent and the midgut wall is clothed with secretory granules which would be swept off during the operation of a press (Figs. 2, 7). It would also seem that peristalsis of the gut would not allow the jaws of the press to be closed for lengthy periods.

Electron micrographs (Figs. 14–18) of three regions of the PM of *Anisolabis littorea* were made: from within the first fold of the midgut, from just behind and also from well behind the cardiac valve. There is some contamination from adherent debris, but not enough to mask the basic structure. It should be pointed out that this material was taken from specimens which had been preserved in spirit for 15 years.

In each of these positions the PM shows the same structure—namely, a fibrillar network with a regular squared arrangement. There appears to be a “less well-organized material overlying the net and filling the interstices” (Waterhouse, 1953a). However, in some places “holes” appear in the interstices (Fig. 18). The rectangular lines of breakage should be noted (Fig. 17), as should the difference between the trends of the meshes in the upper and lower parts of Fig. 14. It looks almost as though two pieces of somewhat differently oriented membrane may be joined. However, no completely convincing explanation comes to mind. While the general appearance shows great similarity to the P.M. of *Periplaneta americana* (Mercer and Day, 1952) there are some important differences. The characteristic hexagonal symmetry of *P. americana* is entirely lacking; there is no “honeycomb network”, except in the shadow of large pieces of debris (Fig. 18); the “irregular meshwork” of *P. americana* is not present; the network meshes in *Anisolabis littorea* are smaller, but the fibrils are much stouter.

Mercer and Day (1952) advance an interesting hypothesis to relate the network structure of the PM of *Periplaneta* to the rodlets of the brush border of the midgut epithelium, for they say that the PM is formed by a process of “exfoliation” and “delamination from a surface” (type II). In the light of Mercer and Day’s argument that the PM of *Periplaneta* is a product of exfoliation, and its essentially similar ultrastructure to that of *Anisolabis littorea*, then the PM of *A. littorea* should be delaminated from the surface of the cells secreting it. How, then, is a continuous PM tube produced by the activity of such a narrow ring of cells? Is the tube formed like the ribbon on a microtome—namely, a length of membrane equal to the width of the secretory cell ring is formed, passed backwards