THE PLEUROPODIUM IN THE EMBRYOS OF TWO SPECIES OF VIVIPAROUS SPOROPHAGOUS SPECIES OF TUBULIFERAN THRIPS (THYSANOPTERA : INSECTA)

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OBSERVATIONS on the presence of developing embryo in the genital tract of viviparous species of Tubulifera are on record\textsuperscript{1–12}, but without adequate structural details regarding the nature of embryogenesis and the incidence of specialized nutritional structures to support the occurrence of viviparity in the respective species. Information presented here relates to some aspects of development of the viviparous/ovoviviparous individuals of \textit{Tiarothrips subramanii} (Ramk) and \textit{Elaphrothrips denticollis} Priesner with particular reference to the development of a special pseudoplacenta called 'Pleuropodium' during later stages of embryonic development.

Embryogenesis in typical oviparous species is initiated only subsequent to the laying of fully mature eggs with adequate yolk reserves. In the ovoviviparous ovaries, mature oocytes in partly yolk-accumulated condition ovulate into the lateral oviduct, where the development of the embryo continues up to blastokinesis. There is a positive correlation between the increase in the size of the embryos in the lateral oviducts and the distance traversed by the embryos in the lateral oviducts. This correlation suggests a quantitative increase in the size of the embryo as it descends down the lateral oviducts. The remaining embryonic development takes place after they are laid. In viviparous ovaries the yolkless pre-vitellogenic oocytes ovulate into the lateral oviduct where complete embryonic development occurs with the subsequent emergence of fully developed larvae. A histological picture of the lateral oviducts with developing embryos (figure 1) indicates the presence of a large number of embryos in various stages of development, more so towards the region of the lateral oviduct which opens into the common oviduct. A statistically significant, proportionate increase in the size of the embryos is also evident as they descend down in the lateral oviduct.

In the viviparous individuals of \textit{T. subramanii} and \textit{E. denticollis}, embryos develop within the lateral oviducts and a part of the nourishment for their development is obtained through the development of a specialized pseudoplacenta called 'Pleuropodium' during the later stages of embryonic development (figures 2 A–E). These pleuropodia are very similar to those described in \textit{Hemimerus} sp, and members of family Polycyrtidae\textsuperscript{13, 14}.

The pleuropodium is a persisting first abdominal segment, ectodermal in origin. The blunt, distal and projects beyond the body wall of the embryo and the proximal end projects inwards into the midline of the embryo. They are bulbous in shape with all the pleuropodial nuclei distributed at their inner margins. No nuclei can be distinguished in the distal projecting region of the pleuropodium. Moreover, no serosa intervenes between the embryo and the wall of the maternal oviduct, and embryo lies free in the lateral oviduct. During the embryonic development, the distal free margin of the pleuropodium on either side, spreads out completely surrounding the whole embryo, to form the pleuropodial sheath. The pleuropodium is only the part of the developing embryo to utilize the available nutrients from the maternal resource at its later stage of development.

In both complete ovoviviparous and viviparous ovaries, the lateral oviduct wall is without any secretory cells and is stretched into a thin membrane. The developing embryos without chorionic covering lie close to the wall of the lateral oviducts and derive nutrients through thin membranous part. Haga\textsuperscript{11} also reported a similar thin and transparent lateral and common oviductal wall in ovoviviparous \textit{B. brevitubus}. Studies on the embryogenesis indicated the presence of the pleuropodium only at a later stage in \textit{Bactrothrips buffai} embryos\textsuperscript{9}. Their possible role in nourishing the embryo was suggested only in the viviparous insect like \textit{Hesperotenes fumarius} Westwood by Jordan\textsuperscript{15–17}, and Hagan\textsuperscript{13, 14}. In ovoviviparous forms, the nourishment of the embryo in the lateral oviduct is exclusively through direct absorption. As is the case with the embryos attaining an advance stage of
Figure 1. Embryonic development in viviparous *Tiarothrips subramanii*. A. L. S. of proximal end of the lateral oviduct with the embryos at initial stages of development (× 133); B. Enlarged view of the early stage viviparous embryo (× 320); C. L. S. of the embryo showing blastoderm formation (× 400); D. L. S. of embryo at an early stage of organogenesis (× 352); E. L. S. of the embryo with completed organogenesis (× 536); F. L. S. of the fully developed larvae at the proximal end of the lateral oviduct (× 115).

development, the increased nutritional requirements are supplemented by the development of pleuropodia. Moreover, the role of pleuropodia in respiration and excretion of embryos cannot be overlooked as indicated by Hagan\textsuperscript{14}.

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Figure 2. Pleuropodia in some viviparous Mycophagous Tubulifera. A. L. S. of the lateral oviduct showing the embryo with pleuropodium attached to the lateral oviduct wall of Tiarothrips subramanii (× 112); B. Early stage of pleuropodium formation in T. subramanii (× 240); C and D. Enlarged view of pleuropodium in T. subramanii (× 752) and (× 272); E. Viviparous embryo of Elaphrothrips denticolis showing pleuropodium (× 272).
ANNOUNCEMENT

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Contributed papers are invited on the topics listed above or on any other area within the general theme of the conference. Offers of papers with 2 copies of abstracts (300 words) on one side of A4 paper, should be sent on or before 16 MARCH 1987 to Dr S G Burnay CPhys MInstP, B149, AERE Harwell, Didcot, Oxon OX11 ORA. It is intended that the Proceedings of the Conference shall be published in The Institute of Physics Conference Series.

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