ABSTRACT

The possible interactions between diet, reproduction, fat content, and the corpus allatum (c.a.) of the flesh fly Peckia chrysostoma (Wiedemann) are investigated using diet manipulations, together with c.a. and ovary implantation/re-implantation techniques.

Oocyte growth requires a proteinaceous diet, and an active c.a., for the ovaries remain immature if protein is omitted from the normal protein/sucrose diet, or after allatectomy. C.a. activity is apparently enhanced by protein, since the gland enlarges in proportion to the volumes of protein ingested, and becomes smaller when protein is withdrawn. Normal reproducing females reveal cycles of protein (and carbohydrate) ingestion and c.a. size. Most ingestion occurs during the pre-yolk phase during which the c.a. size increases to a maximum. During vitellogenesis, when these protein metabolites are deposited as yolk, the c.a. size diminishes to become minimal when deposition is complete. It is suggested that these protein yolk precursors are responsible for promoting c.a. activity.

Fat content also fluctuates in relation with reproductive, c.a. size and ingestion cycles. Body (excluding ovarian) fat increases progressively until mid-yolk deposition, but rapidly decreases to a minimum reached when vitellogenesis ends; meanwhile, ovary fat increases continuously - suggesting a transfer of fat from body reserves to the oocytes after mid-yolk formation. Possibly, these fluctuations are induced by the ovary and c.a. The ovary may, by means of a hormone, accelerate body fat synthesis since this is markedly reduced after ovariectomy. The active c.a., on the other hand, possibly mobilizes body fat for oocyte development as body fat accumulates after allatectomy. As fat reserves increase in proportion to the quantity of protein ingested even when carbohydrate ingestion is constant, it is suggested that protein may be a nutritive source of fat.

In conclusion, the experimental evidence presented indicates that ingestion, reproduction, c.a. activity and fat synthesis are closely integrated functions.