Table 1 *Histochemical tests for elastin and collagen*

Histochemical tests applied	Inner layer (elastin)	Outer layer (collagen)
Heidenhain's Azan	−	++
Periodic acid/Schiff (PAS)	++	−
PAS/saliva	++	−
Aldehyde fuchsin	+++	−
Verhoeff's reaction	++	−
Verhoeff's/Van Gieson	B++	R+
Orcein/Van Gieson	+	+
Aniline blue	−	+++
Luxol fast blue G in methanol	+	+

+++=intensely positive; ++=strongly positive; +=moderately positive; −=negative; B=black; R=red.

which is resistant to saliva digestion. But the outer layer exhibited a negative response to this stain, indicating its varying chemical composition. The inner layer showed positive response to Verhoeff's (figure 2) and Unna's orcein stains.

The outer layer is stained dark blue with Heidenhain's Azan (figure 3). When aniline blue stain is applied, the outer layer responded very strongly (figure 4). In addition, positivity is also observed with Verhoeff's/Van Gieson and Orcein/Van Gieson techniques. Both the layers showed a positive response to Luxol fast blue G in methanol.

Table 1 shows the histochemical techniques conducted and their reactions.

Therefore it could be concluded that the inner lining of the foregut consists of an inner elastin and an outer collagen layer. There are several reports on histological and histochemical studies on crustaceans[1,7,8] but until now there are no reports showing the presence of elastin and collagen layers of foregut in isopods. The elastic nature of the stomodaeum and proctodaeum in amphipods have been elucidated[9].

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INDUCTION OF OVARIAN DYSFUNCTION IN *DYSDERCUS SIMILIS* BY 25-AZACHOLESTEROL

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EARLIER studies have demonstrated that insects require dietary source of sterol for growth, development and reproduction[1]. It is also shown that Azasteroids inhibit the biosynthesis of cholesterol from dietary phytosterol[2]. Sterol concentration in larval diets can also affect ovarian development and viable egg production[3]. Our results presented below show that ingestion of 25-azacholesterol disturbs the normal ovarian development in *Dysdercus similis*.

The bug *D. similis* was reared at 27 ± 1°C and RH of 65±5% and fed on soaked cotton seeds. The freshly ecdysed fifth instar nymphs (20) were fed on cotton seeds coated with varying concentrations (500–2000 ppm) of 25-azacholesterol (3β-hydroxchol-5-en-24-dimethylamine) dissolved in methanol; 500 ppm was the concentration at which the activity was maximum. Controls were fed on cotton seeds coated with methanol. The experiments were repeated thrice. The abnormalities after ecdysis were observed in the treated insects and their gonads.

The freshly ecdysed fifth instar nymphs after feeding on the seeds coated with 25-azacholesterol (500 ppm) showed drastic abnormalities. The final instar life span was increased significantly from 7 to 15 days. These nymphs moulted into adults with malformed wings (figures 1 and 2). Most of them

Figures 1–7. **1–3.** Adults with malformed wings. **1.** Two segmented antenna. Also note the abnormal appendages (arrows). **3.** An adult with two pairs of appendages. **4.** Ovarioles with 2–3 matured oocytes while the distal oocytes are resorbed. **5.** Ovarioles with 2–4 oocytes enclosed in a common sheath (arrow). **6.** Ovarioles with excess (> 4) of oocytes enclosed in a common sheath. Also note the entire ovariole undergoing resorption. **7.** Ovarioles with double the number of oocytes. Vitellogenic oocytes occupying intermediate position (arrow).

were unable to expand the wings fully after eclosion; in such cases the appendages were crippled, segments of antennae were reduced and often the length of tibia and tarsi varied. In a few cases only two pairs of appendages were observed (figure 3). Slow growth of larvae and adult wing malformation in south western corn borer. *Diatraea grandiosella*, was reported[4]. Ovarian development was drastically

affected. In most cases 2–3 terminal oocytes developed and the rest of them were resorbed (figure 4), while in some other cases each ovariole consisted of 2 to 4 oocytes enclosed in a common sheath. These occupied either the terminal position or between distal and terminal oocytes. Such oocytes were yolk laden (figure 5). In certain insects more than 4 oocytes were found in a common sheath in the terminal region but these underwent resorption and formed a loose meshwork of ovarian tissue (figure 6). Often in some insects the number of oocytes increased two-fold forming a long ovariole. These oocytes were smaller in size and the vitellogenic oocytes were found between the resorbing oocytes (figure 7). Inhibition of ovarian development by steroids was also reported earlier[4–6].

The ingestion of 25-azacholesterol inhibits ovarian development and suggests its use for the development of safe and specific anti-fertility agent for *D. similis*.

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A NEW RECORD OF *HEXAMERMIS* SP (MERMITHIDAE — NEMATODA) FROM THE LARVA OF *CYDIA LEUCOSTOMA* MEYR (EUCOSMIDAE — LEPIDOPTERA)

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TEA plants are frequently attacked by a wide variety of insect and mite pests and a few root-feeding nematodes resulting in crop and capital loss[1]. One of the most serious insect pests is the larva of *Cydia leucostoma* Meyr commonly called as flushworm.

The survey of literature shows that the mermithids are recorded from fifteen of the insect orders, the widest host range for any of the entomophilic nematodes, but not on the flushworm. The present author recorded the presence of juvenile *Hexamermis* sp in flushworm in and around Kil-Kotagiri, Nilgiris District, Tamilnadu (4800′ to 5500′ above mean sea level) especially during the rainy months viz October, November and December. The presence of *Hexamermis* sp in flushworm is a new host record. One to five juveniles were found within the haemocoel deriving the nutrients through transcuticular absorption. The juveniles are parasitic and the adults are free living. Parasitization by these juveniles resulted in host mortality even before their emergence.

The biology of *Hexamermis* sp and its possible application in the biological control of insect pests are under investigation. This living pesticide, being non-host specific, could be used to control flushworm and other insect pests.

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