attempts to observe the feeding behaviour of adult mites a mixture of aquatic organisms consisting of ostracods, copepods and first instar larvae of *Ae. albopictus* were offered as food. To determine the feeding rate of adult female of *E. similis*, 15 vials, each containing 50 first instar larvae of *Ae. albopictus* and one *E. similis* were set up. Control consisted of a vial of the same size as the experimental one containing 50 first instar larvae of *Ae. albopictus* but without mite. Observations were made once every 24 h. After each observation the dead larvae were removed and a fresh set of larvae was released in each container. This was carried out until the death of the mite.

The adults of *E. similis* female showed strict preference for the first instar larvae of *Ae. albopictus.* The prey was seized at the cervical region by the pedipalps (figure 2) and the first and third pairs of legs (figure 1). Within 2–4 min the mosquito larvae became inactive. The mite ingested the internal contents leaving the transparent exoskeleton behind. On an average one mite was found to consume 40 larvae/24 h. In the control vials the average mortality was 5 larvae/24 h. It is possible to differentiate between larvae which died of natural causes and those died as a result of mite attack. Longevity in captivity of adult female mite ranged from 6 to 12 days. Larval consumption was steady for all the days of observation. Mites laid viable eggs in the holding vial. Each cluster of eggs contained about 6–20 eggs. The period from oviposition to hatching was 4–6 days at room temperature. Attempts are now being made to rear the mites in the laboratory.

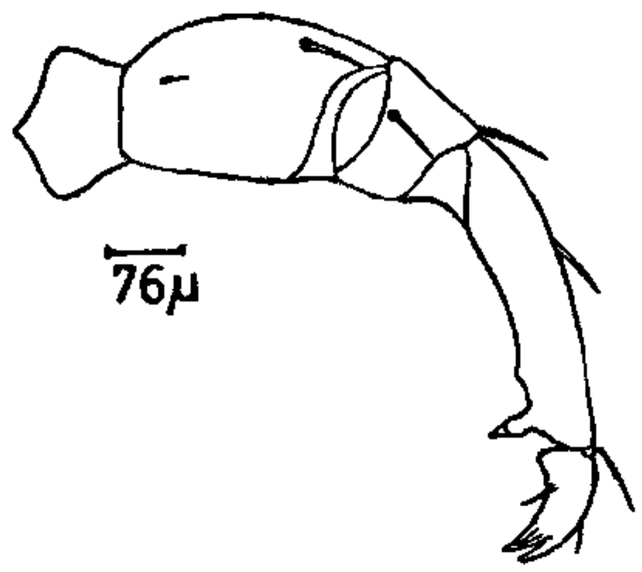

Figure 2. Palp of ♀ *E. similis.*

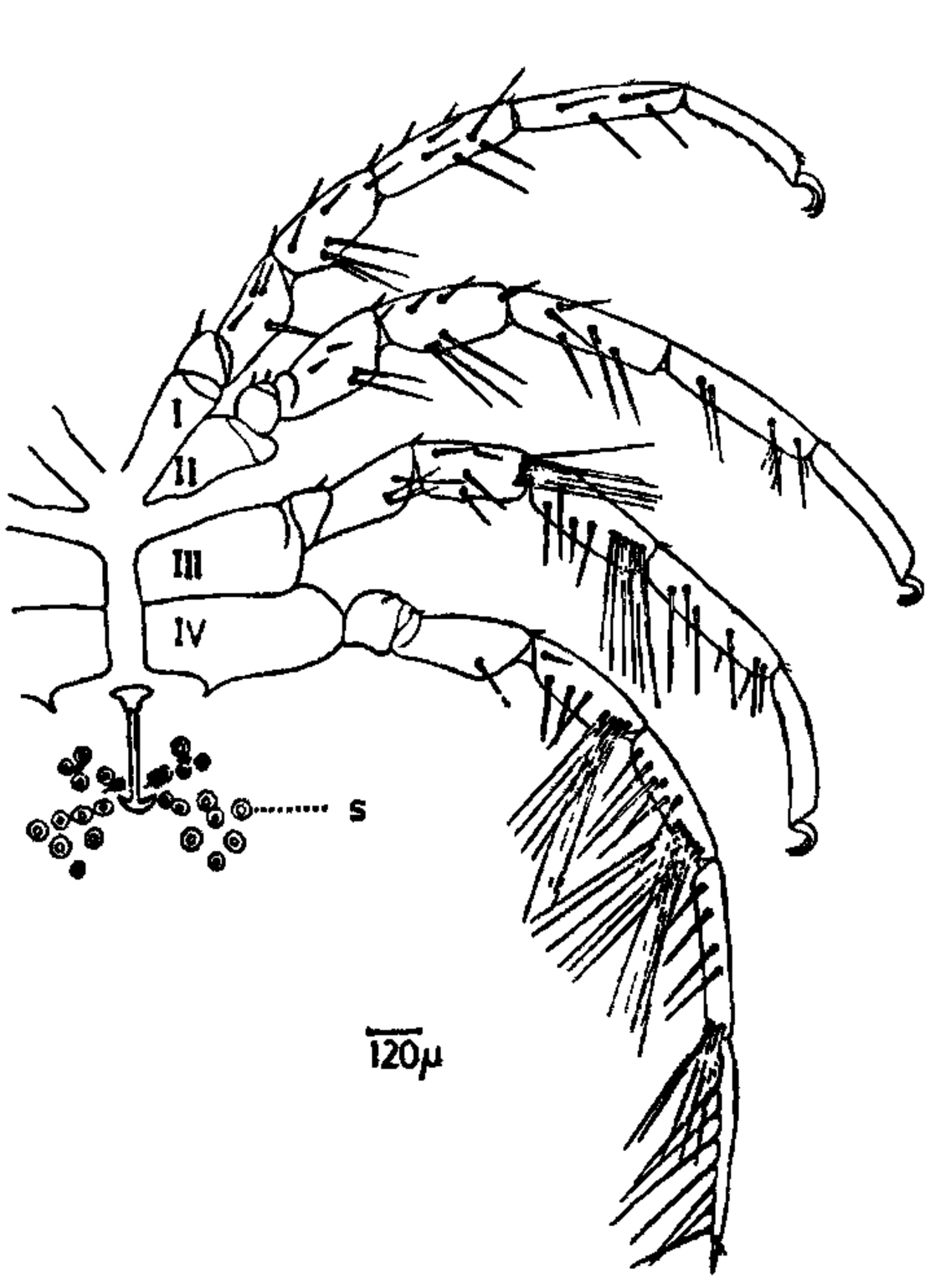

Figure 1. I, II, III and IV coxae of ♀ *E. similis* s-acetabula.

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BEAUVERIA BASSIANA (BALS.) VUILL., A POSSIBLE BIOCONTROL AGENT AGAINST *MYLLOCEROS VIRIDANUS* FABR. AND *CALOPEPLA LEAYANA* LATREILLE IN SOUTH INDIA

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TEAK (*Tectona grandis* L.), a large deciduous tree, occupies 78,452 ha of forest plantations in Kerala[1].

Apart from the two major pests, *Hyblaea puera* Cramer and *Eutectona machaeralis* Walker, a defoliating beetle *Mylloceros viridanus* Fabr. (Coleoptera: Curculionidae) is of common occurrence known to cause some damage to teak trees in Kerala[2].

During routine observations in 1985–86 for biocontrol agents against teak pests in plantations at Peechi many dead beetles of *M. viridanus* were found infected with a fungus (figure 1). The beetles were collected, surface-sterilized in 0.01% mercuric chloride for 3 min, washed several times with sterile water and plated on potato dextrose agar (PDA); the inoculated petri dishes were incubated at 27±2 C. The infected beetles consistently yielded a fungus, viz. *Beauveria bassiana* (Bals.) Vuill. (IMI No. 313442) in culture. The identity of the fungus was confirmed by CAB International Mycological Institute, England.

Field collected healthy beetles were used in pathogenicity tests. The spore suspension of the pathogen was prepared by flooding 7-day-old cultures of the fungus on PDA and the concentration of the spores maintained at 1×10^5 spores per ml. In one set, the upper surface of 30 beetles was sprayed with the spore suspension directly with an atomizer and then transferred to plastic jars containing surface-sterilized young teak leaves provided as food material. In the second set, teak leaves (10 × 5 cm bits) were sprayed with the spore suspension and transferred to plastic jars and 30 test beetles introduced into the container. Controls contained beetles and leaves sprayed with sterile distilled water.

In another experiment, pathogenicity of the fungus was tested on *Calopepla leayana* Latreille (Coleoptera: Chrysomelidae), a major pest of *Gmelina arborea* L., a fast growing hardwood species raised in plantations in Kerala. Adults and larvae of *C. leayana* were treated with the spore suspension as described above. Leaves of *G. arborea* were also sprayed with the spore suspension and adults and larvae introduced into plastic jars. All the experiments were repeated thrice and observations recorded after 24 h. The results on the percentage mortality are given in tables 1 and 2.

The results clearly indicate the effective role of *B. bassiana* in causing mortality of *M. viridanus* and *C. leayana* when inoculated under laboratory conditions. Direct application (DA) of the spore suspension caused 53% mortality of *M. viridanus* whereas the mortality was 43% in leaf-treated ones (LA).

In the case of *C. leayana* the mortality of the larvae was 33% and 30%, and adults 85% and 80% in DA and LA respectively after 5 days. In both the sets all the adults were killed after 11 days of incubation. The experiments reveal that direct application of spore suspension is more effective than leaf application. The mortality of *M. viridanus* is low when compared to the 70% mortality (based on a collection of affected and healthy beetles on teak in the Kerala Forest Research Institute Campus during August 1986) observed in the field. This may perhaps be due to the difference in conditions prevailed in the laboratory (temp. 27–29°C and RH ranged between 70 and 72%) and out doors (temperature

Figure 1a, b. *Mylloceros viridanus.* Healthy (a) and naturally infected by *B. bassiana* (b), (× 6).

Table 1 *Percentage mortality (after 5 days) of teak defoliator Mylloceros viridanus treated with spore suspension of Beauveria bassiana*

Treatment	Spore concentration	Percentage mortality
Direct application of spore suspension	1×10^5	53
Spores applied on leaves	1×10^5	43
Control	Sterile water	6

Table 2 *Percentage mortality of larvae and adults of Calopepla leayana treated with spore suspension of Beauveria bassiana*

Treatment	Spore concentration	Percentage mortality		
		After 5 days		After 11 days
		Larvae	Adults	Adults
Direct application of spore suspension	1×10^5	33	85	100
Spores applied on leaves	1×10^5	30	80	100
Control	Sterile water	5	8	11

ranged between 20 and 33°C and RH 65 and 96%). The reason for higher mortality of adults in comparison with larvae of *C. leayana* is not clear.

B. bassiana is a known pathogen of many insects in both temperate and tropical countries[3-5]. The fungus is considered to be potentially suitable for biological control of insects due to its broad spectrum of virulence to insects and its suitability for large scale culture[6,7]. *B. bassiana* is best known as the causal agent of the disastrous muscardine in silkworms[8]. In teak, it is reported to cause mortality of leaf skeletonizer, *E. machaeralis* in Karnataka, India[9]. The present study reports the potentials of *B. bassiana* as a biocontrol agent against *M. viridanus* and *C. leayana* under laboratory conditions. Further studies are, however, necessary to find out its potential as an agent of biocontrol against these pests under field conditions.

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INFLUENCE OF METHOPRENE ON THE MALE REPRODUCTIVE SYSTEM OF *ORYCTES RHINOCEROS* (COLEOPTERA: SCARABAEIDAE)

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SPERMATOGENESIS in insects in believed to be under hormonal control[1]. Dhondt *et al*[2] found that methoprene treatment resulted in 'adultoids' (pupal-adult intermediates) in rhinoceros beetles; the authors however overlooked their internal structure. The present study gives details of action of methoprene on the male reproductive system of *Oryctes rhinoceros*, a major pest of the coconut palm.

Third instar larvae of *O. rhinoceros* were collected from local manure pits and reared in the laboratory on sterilized cowdung in small plastic containers. Methoprene (ZR 515, gift from Dr G. B. Stall of Zoecon Corporation, USA) was dissolved in acetone so that 1 μl contained the desired quantity of hormone (100, 50 and 20 μg). The hormone was applied topically on the ventral abdominal segments of newly emerged male pupae. The controls received only acetone treatment.

From the control pupae normal adults emerged with well-developed reproductive system from 16 to 18 days of pupation. In these the testis follicles (six in number) were separate disc-shaped organs, each follicle measuring 1-2 mm diameter (figure 1). In each follicle secondary spermatocysts and early