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**Note**

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# Some Observations on the *Lepidoscelio viatrix* Brues-A Potential Biocontrol Agent of the Mulberry Pest *Neorthacris acuticeps nilgerensis* Uvarou

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***Lepidoscelio viatrix* is a potential biocontrol agent of the eggs of wingless grasshopper, *Neorthacris acuticeps nilgerensis,* in mulberry plantation in natural conditions. The present investigation was undertaken to understand the attachment of the parasite to the hopper under scanning electron microscope and the oviposition behavior of the parasite. The results reveal that the parasite grips firmly to the lateral and dorsal surfaces of the female grasshopper with its mandibles implanted in the intersegmental membranes of the abdominal segments. During oviposition, *L. viatrix* initially turn around the egg pod and protrude its ovipositor and insert into the eggs. It lays eggs inside the eggs of grasshopper by an up and down movement of the ovipositor. Further, field observations indicated a drastic fall in the incidence of the grasshopper population on mulberry, with the increased parasitization of *L. viatrix*.**

**Key words**: *Lepidoscelio viatrix*, parasite, *Neorthacris acuticeps*, mulberry, scanning electron microscopy

## Introduction

Mulberry (*Morus* spp.; Family: Moraceae) provides a basic raw material for the sericulture industry, as its leaves are the sole food for the silkworm, *Bombyx mori* L. Its cultivation plays a vital role in determining the overall productivity in Sericulture especially the yield, quality and cost of cocoon/silk production. The production of appreciable quantity and quality mulberry foliage is often hampered by insect pests, parasites and pathogens (Kumar *et al.*, 2000). The total loss of mulberry foliage crop due to these natural enemies in India is about 20% per year (Gupta *et al.*, 2000). Among insects, the wingless grasshopper, *Neorthacris acuticeps,* is a serious pest of mulberry, which feeds on its leaves and sprouting buds. Where the insect incident is more the mulberry plants were tend to be reduced to mere sticks (Kariappa and Narasimhanna, 1981a). Several chemical control measures have been developed and adopted to eradicate the pest (Kariappa and Narasimhanna, 1981b). Still, *N. acuticeps* continues to be a serious destructive insect pest for mulberry and other agricultural crops.

Presently, there is a quest for finding biological control methods against insect pests because of the potential hazards of chemical pesticides to humans (Pereira *et al.*, 1989; Grichar *et al.*, 1992). Since mulberry leaves are to be fed to silkworms, chemical insecticides cannot be relied upon, because their improper use can also be harmful to silkworm growth. Therefore, the use of chemical insecticides has got limitations in sericulture industry. A potential hymenopteran egg parasite, *Lepidoscelio viatrix* Brues was reported on the abdomen of adult females of *N. acuticeps* in mulberry plantation (Kariappa and Narasimhanna, 1981a). But so far, much work has not been carried out on this potential egg parasite of wingless grasshopper. Therefore, in the present study an attempt has been made to understand the attachment of the parasite to the hopper under scanning electron microscope and the oviposition behavior of the parasite.

## Materials and Methods

Female hoppers of *N. acuticeps* along with the parasites attached to their abdomen were collected from the mulberry germplasm of the Central Sericultural Research and Training Institute, Mysore, India during June September

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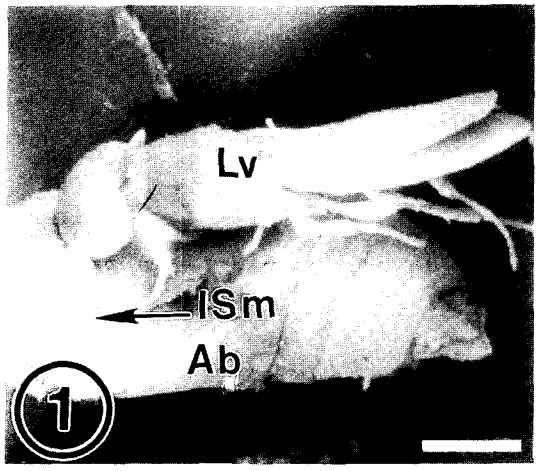


**Fig. 1.** Scanning electron microphotographs showing the parasite, *Lepidoscelio viatrix* (Lv), attached with its mandibles to the intersegmental membrane (Ism) of the abdominal segments of grasshopper (scale bar = 400 $\mu$m).

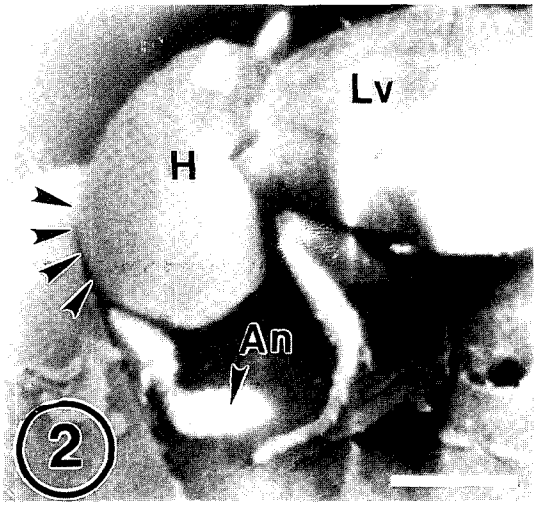


**Fig. 2.** Magnified view of the attachment (arrow heads) of parasite to the intersegmental line. H = head; An = antenna (scale bar = 200 $\mu$m).

2001 and reared in plastic Jars of 20 cm diameter and 12 cm height. Pasteurized soil was kept in each jar up to 4 cm height to observe the oviposition behavior of *N. acuticeps*. To study the parasite attachment, a few specimens of *N. acuticeps* were etherized and the abdominal segments along with the parasites were dissected and fixed for scanning electron microscopy for 2 hours in 2.5% glutaraldehyde (pH 7.2) at room temperature. The fixed samples were washed in cacodylate buffer thrice and then dehydrated in graded alcohol-acetone series and dried in a critical point drier (EMS 550). The dried samples were carefully mounted onto copper stubs and coated with gold using a sputter coater (EMS 850). The coated samples were examined under JEOL 100 CX II ASID 4D scanning electron microscope at 20 kV.

## Results and Discussion

The egg parasite, *L. viatrix,* was observed on the abdominal segments of grasshopper *N. acuticeps* during June September in mulberry plantation. The parasite is black in color and 1.85 mm in size. Channa Basavanna (1953) also reported that wingless grasshopper affected plants like red gram, Lantana and various weeds, and about 24% of these grasshoppers carried the parasites on their abdominal segments. The present study under scanning electron microscope shows that the parasite grips firmly to the lateral and dorsal surfaces of the female grasshopper with its mandibles implanted in the intersegmental membrane between abdominal segments. The grip of the mandibles is so firm that the parasite cannot be easily separated from the host body (Figs. 1 and 2). The rest of the parasite body except head region is not clamped to the host body. The parasite did not leave its hold on its host even while the male and female hoppers were mating. The parasite never relaxed its hold until the female began to bore into the soil for oviposition. When more than half of the abdomen of female had gone into the soil, the parasite released it host and came up to the margin of the oviposition-burrow, and did not hold it until the grasshopper had withdrawn its abdomen after oviposition after the eggs were laid in the form of a cylindrical pod below the soil surface. When the grasshopper withdraw from the burrow the parasite approaches the egg pod and start taping the surface of the egg pod with its antennae for sometime. The parasite then turns around the egg pod and protrudes its ovipositor from the tip of the last abdominal segments, and inserts it into the eggs. It lays eggs inside the eggs of the grasshopper by an up and down movement of the ovipositor. After laying the eggs, the parasite again came in contact with the host; it crawled up the abdomen and immediately fixed itself to one of the intersegmental membranes. Field observations indicated a drastic fall in the incidence of the grasshopper population on mulberry, with the increased parasitization of the insect, *L. viatrix*. Further, a detail study on the biology, bionomics and other parameters of the parasite on the mulberry pest is under progress.

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