

## DISTRIBUTION AND MULTIPLICATION OF SYMBIOTIC MICROORGANISMS IN THE EGGS OF BROWN PLANTHOPPER DURING ITS EARLY EMBRYOGENESIS

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THE existence and activities of symbiotic microbes are considered crucial for the normal nutritional and reproductive physiology of the host insect, particularly among Homoptera. It is well established that in host embryo the symbiotes multiply only to a limited extent and a mass increase is achieved only during post-embryonic development<sup>1</sup>. *Nilaparvata lugens* Stal, the brown planthopper (BPH), is an important pest in rice, known to harbour yeast-like organisms (YLOS) as symbiotes acquired transovarially<sup>2</sup>. The present report deals with the trend in multiplication of these symbiotes in the eggs of BPH from the time they are deposited to the external environment. Also the density of symbiote-inoculum was estimated in eggs before they were actually deposited.

To assess the level of inoculum of symbiotes in eggs before they were laid the abdomen of 10 gravid females was cut open and the eggs were carefully removed with a soft brush. The eggs were thoroughly rinsed in water twice to remove the adhering mycetocytes from the maternal tissues. The eggs were crushed individually in a cavity slide and the contents were thoroughly mixed with a drop of water. The yeast-like symbiotes were counted under a light microscope. Similarly the YLOS in normally laid eggs were counted at different time intervals.

In BPH the symbiotes are present as a small ball-like



Figure 1. *Nilaparvata lugens* Stal. Primary oocyte showing the symbiotic-ball (SB)  $\times$  500

mass at the posterior pole of the egg. The diameter of the symbiotic ball was measured in 40 'undeposited eggs' and in 0.5–4 hr old normally laid eggs using a standard micrometer. The size of the symbiotic ball in the former category was 69.6  $\mu$  in diameter while it measured 82.8  $\mu$  in the eggs of 0.5 to 4 hr old indicating an active multiplication of the symbiotes within the period between two observations.

The eggs extracted from the insect's abdomen contained an average of 193.2 YLOS per egg while the mean number was 343.3 in eggs of 0.5 to 4 hr old. With the development of embryo the symbiotes gradually increased in number, the average being 787.8 in eggs of 60 to 65 hr and 1121.7 in eggs of 85 to 90 hr after oviposition. From this six-fold increase in the symbiotic population from its initial level it is evident that a state of equilibrium is maintained between the developing host embryo and its symbiotic population.

This low inoculum potential of symbiotes during early embryogenesis offers a possible stage exploitable to destabilise the host-symbiotic equilibrium through antibiotics aimed at the population control of the insect pest in the later stages.

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## INDUCTION OF QUIESCENCE IN MUGA SILKWORM *ANTHRAEA ASSAMA* WESTWOOD

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MUGA Silkworm, *Antheraea assama* Westwood (Lepidoptera, saturniidae) is an endemic sericigenous insect of north-eastern India. It is multivoltine having five to six generations in a year. Spring and autumn seasons are more favourable for commercial rearing. Adverse environmental conditions such as high temperature and heavy rainfall in summer and low