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DIFFERENTIAL BROOD EMERGENCE OF SUB-TROPICAL MEGACHILID BEES

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DIAPAUSE is a physiological process[1] and occurs in insects during adverse climatic and physical conditions[2,3]. It may be obligatory or facultative; however, the purpose is to tide over the harsh environmental extremes. Megachilid bees in subtropical climates show multivoltine life cycle[4,5]. Here a part of each seasonal brood always remains in dormancy. The implication of such a behaviour pattern and the possible factors causing this behaviour are given below.

The study was conducted from 1976 to 1981 on the emergence pattern of three species of megachilid bees *viz Megachile flavipes* Spinola, *M. lanata* Lepel and *M. cephalotes* Smith. The pattern of emergence is shown in figure 1 which clearly indicates that a part of the brood of each season remains always in the state of larval diapause. These bees do not show an obligatory diapause and univoltine life cycle; rather the diapause seemed to be facultative, resulting in multivoltine life cycle pattern. It is opined that facultative diapause is largely controlled by environmental factors[2,6-12]. Different races/strains of a species may become genetically differentiated with respect to diapause so that their behaviour is different and not readily altered[10]. This is best shown in the present study where each seasonal brood has a specialized fraction which shows different degree of diapause and hence differential emergence spreading from 2 to 5 subseasons (defined by Sihag[5]).

The most consistent indicator of season is the day length or photoperiod[2,7-11] and this is the most important sign stimulus initiating diapause. Photoperiodism should not be a factor to induce emergence or breakage of diapause in these bees because the developmental stages are completely deprived of light due to the complete darkness in their nests. Other possible indicators are temperature, the state of the food and age of parents[10]. Kapil and Sihag[13] opined that probably caloric value reward provided during mass provisioning of food for developing larvae may act as an external signal to cause differences in the degree of diapause leading to a differential brood emergence. On the other hand, temperature plays a big role in the induction of diapause in these bees[14]. Age of the parents may also be responsible for the production of such eggs which may show differential emergence in a brood. Whatever the recourse may be, the ultimate end is the presence of differential brood emergence where the emergence of a

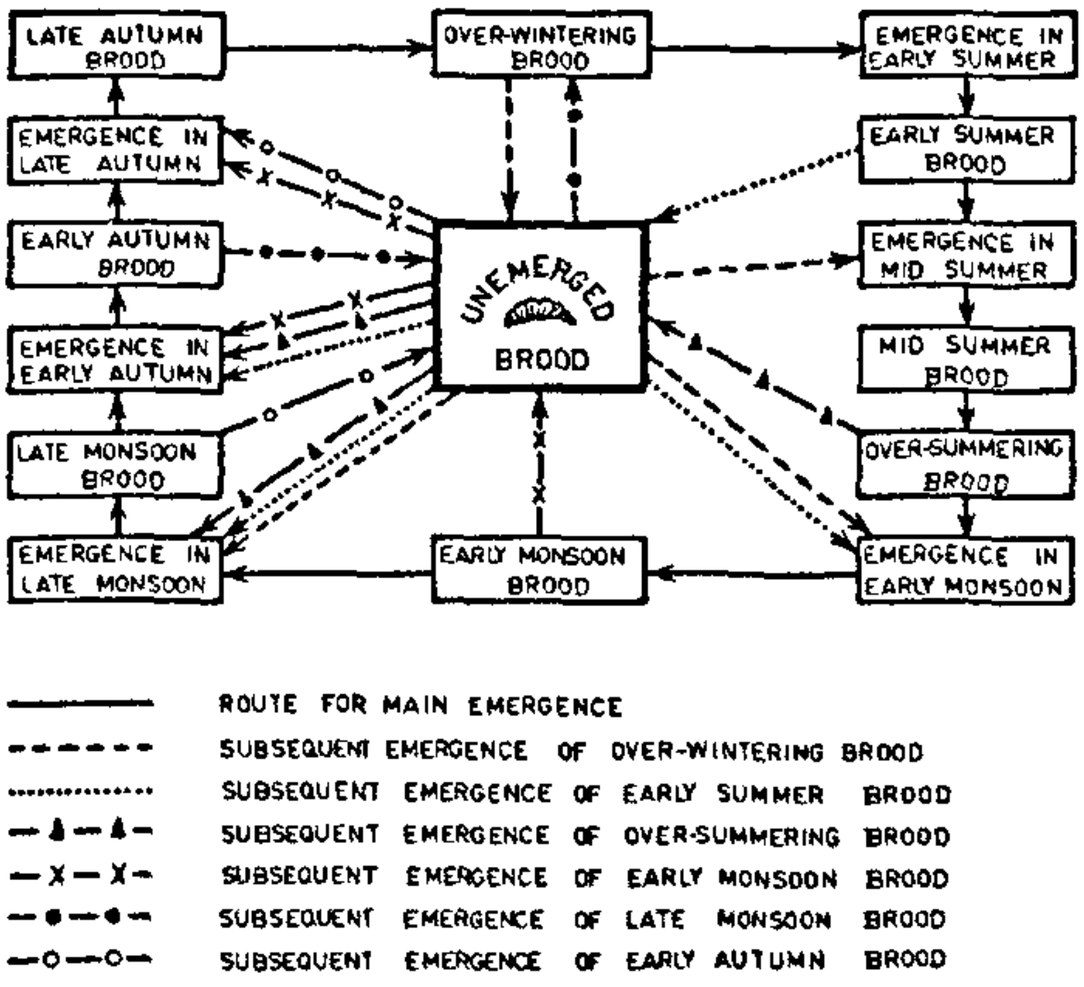

Figure 1. A schematic model on the emergence pattern of subtropical solitary megachilid bees to show that besides main emergence in immediate next season, a part of each seasonal brood contributes to the unemerged brood pool which shows a differential emergence spreading over 1–3 sub-seasons.

particular brood is completed in more than one step, keeping a part in the unemerged brood pool in the form of diapausing larvae (figure 1). This probably helps these bees to tide over any sudden and unpredictable violent environmental catastrophes[3].

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THE VOLUME OF THE CORPORA ALLATA IN RELATION TO VITELLOGENESIS IN THE BUG *LEPTOCORIS COIMBATORENSIS* GROSS (HEMIPTERA: COREIDAE)

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INSECTS like *Cimex lectularius*, *Oncopeltus-fasciatus* and *Rhodnius prolixus* the egg maturation is controlled by the corpus allatum[1-3]. During yolk deposition in the oocytes in *Rhodnius prolixus*, the size of the corpus allatum increases[4]. Similar correlation between the egg maturation and the increased cytoplasmic volume of the corpus allatum has been found in other hemipterans, coleopterans and hymenopterans[5-8]. Generally the gland size is correlated with the quantity of the gonadotropic hormone produced and its high activity.

This communication deals with the relationship between the volume of the corpora allata (CA) and vitellogenesis, in *Leptocoris coimbatorensis*.

The experimental insects were reared at 30 ± 1°C and RH of 65 ± 5 %. They were fed on soaked soapnuts. The freshly ecdysed adults were treated with 1 μl of 0.01 μg of hydroprene per insect. The ovaries of the control and treated insects were processed for histological studies. The volume of the CA of these insects was measured with a stage micrometer and occulometer and the volume was calculated using Tobe & Pratt's procedure.[9]

Corpora allata are generally paired but in *Leptocoris*, it is unpaired and oval shaped located within the head capsule, posterior to the brain and the corpora cardiaca. The size of the corpus allatum and the stage of development of the oocytes are closely related. Vitellogenesis in the control bugs commences on the second day and continues upto the fourth day, when the oocytes are fully laden with yolk. During vitellogenesis in the controls, the follicular epithelium changes its shape from columnar to cuboidal and then to squamous form, in accordance with the size of the oocyte. The incorporation of the yolk into the oocytes takes place through the intercellular spaces of the follicular epithelium.

The volume of the CA observed was 0.69, 0.79, 0.82, 1.5, 2.53 and 1.1 nl in the 0, 1, 2, 3, 4 and 5 days control adults respectively. This showed that the volume of CA increased gradually upto the fourth day after which it declined, thus coinciding with the oviposition.

In the treated adults the ovaries showed initiation of yolk deposition but on the third day and onwards there was oosorption. The cells of the follicular epithelium did not differentiate as in the controls. The volume of the CA was also considerably different being 0.69, 0.79, 1.2, 0.51 and 0.45 nl in the 0, 1, 2, 3, 4 and 5 days old treated adults respectively. This shows that with the decrease in the volume of the CA further progress of vitellogenesis was prevented (figure 1).

From the above cited results we see that the volume of CA increases upto fourth day and on this day the yolk deposition is almost complete in the controls, thus showing that JH controls vitellogenesis. Application of hydroprene resulted in the fall in the volume of CA