6. SUMMARY

The dissertation embodies the following five aspects of diapause physiology of the tropical tasar silkworm, *Antheraea mylitta* Drury (Lepidoptera : Saturniidae) :

1. Phenology of different stages of life history of non-diapause and diapause generations,

2. Determination of critical weight of fifth instar larvae and timings of PTTH release during larval-pupal transformation in the two generations,

3. Profile of cholesterol, protein, DNA and RNA contents in some tissues (such as haemolymph, fat body and gonads) of pre-pupae, pupae and adults of both the generations for ascertaining the state of pupal-adult development in the diapausing pupae,

4. Effect of insulin on pre-pupae and pupae of diapause generation for the termination of pupal diapause, and

5. Effect of exogenous 20-hydroxyecdysone on pre-pupae for the termination of pupal diapause.

A considerable variation occurs in the total larval duration, spinning duration, pre-pupal life span and the pupal life span of the two generations. Pupal duration of non-diapause generation is about 20 days and that of the diapause generation is about 208 days. The daily temperature and daylength appear to be crucial for pushing the larvae for diapause orientation. A short daylength of <12 hours in combination with a low temperature of $<18°C$ trigger the larvae from third instar onwards to orient progressively for the induction of diapause after pupation. Because of utilization of stored energy as maintenance cost during the

prolonged pupal life, the grainage performance is quite poor in the diapause generation than in the non-diapause generation.

The larval critical weight (Lcw) is attained on the 9th day and on the 15th day of 5th stage larvae of non-diapause and diapause generations respectively. Lcw has been determined from the starvation experiment.

A three-step sequential release of PTTH occurs in both the generations during larval-pupal transformation. From the neck ligation experiment it is revealed that the first release takes place on the day of attainment of Lcw, the second one at about 5 hours after gut purge and the third one occurs 2-3 days before pupation. This phenomenon is consistent in both the generations.

Biochemical profiles have been assessed for the prepupae, pupae and adults of both the generations in order to have a comparative picture of mobility of building molecules in different tissues pertinent to development. Cholesterol and protein contents have been determined in the haemolymph, fat body and gonads while the DNA and RNA contents have been estimated in the fat body and gonads.

The pattern of biochemical profiles is quite similar in the two generations. The overall mobility of the biochemical contents among the tissues assessed reveals that adult development is initiated around 14th day of pupa in case of non-diapause generation and around 150 day of diapause generation.

The effect of insulin on the diapause physiology has been evaluated after application to the pre-pupae and 40 and 150-day old pupae of diapause generation. A 10-µg dose of insulin/individual when applied to the pre-pupae and 40-day pupae, reduces the pupal life span by at least 10 days. This implies that the function of insulin is analogous to that of the PTTH in the initiation of adult development. This conclusion is based on the life span and weights of pupae and adults, fecundity, hatchability, gonad weights and profile of the biochemical contents.

The 20-hydroxyecdysone when applied at the rate of 1,2,5 and 10 µg/ pre-pupa, induces adult development earlier. The pupal life span is reduced variably according to the doses applied. A dose of 5 µg/pre-pupa has given the best result considering all the parameters studied. The reduction of pupal life at this dose has been always by more than 10 days.