CHAPTER 6

GROWTH STUDIES
It is a matter of common experience that animals grow in size. Increase in size of living organisms, is commonly called growth. But for the point of view of biology it is a very complicated process. Almost all the living processes occurring within the animal help in its growth. Carbohydrates and other substances are absorbed by digestion of food. The oxidation of these substances produces energy, which is utilised in mitosis. The elongation and differentiation of new cells produces growth. The animals, which reproduce generally grow to adulthood by the division and differentiation of the fertilized egg. It is important that there should be coordination between cell division and differentiation so that the new tissues may develop into definite organs. If these activities are not properly correlated to the growth deviates from its original plan, then tumors and galls are formed on animal organs.

An insect is being fed for growth, faltering silk secretion (or) other reproductive functions. The growth offering insect body as a whole is generally measured as an increase in weight. An insect may increase in weight through the deposition of fat without any increase in the structural tissues and organs which characterised growth. A silkworm which is receiving insufficient amino acids and energy lipids carbohydrates to permit growth of its, organs and muscles may still show an increase in size due to exoskeleton growth. In normal growth, in nutritional
studies, is referred to as the state of nutrition and health and describing growth and productive performance. Malnutrition either in calories or on some specific nutrients results in retardation of growth. The nature and extent of the effect on growth are dependent upon the character and severity of the deficiency and upon the period involve. A deficiency of certain nutrients such as phosphorus, calcium (or) vitamins shows an indirect impact on increased in size by decreasing appetite as well as causing direct physiological effects. Restriction in diet, in rats resulted in much leaner animals with somewhat less skeletal size, but improved health, female fertility and longevity and delete the onset of degenerate diseases (Benjamin, 1960; Benjamin and Simms, 1960).

Growth results in the formation of new protoplasm and cell walls. Hence it is important that anabolism should be higher than catabolism i.e. protein molecules should be produced in such quantities that they can repair damaged tissues and at the same time formed new protoplasm. The oxidation of glucose is also necessary for the supply of energy for anabolic process. Several studies have suggested that fluoride influences the metabolism of proteins, lipids and carbohydrates resulting in growth retardation in mice (Vijaya Bhaskara Rao, A. 1994). Chinoy (1993) has reported that fluoride polluted mulberry leaves altered fecundity, growth rates and mortality and decreased cocoon yield in silkworms. Pillai (1988) reported that both body weight and food and water consumption decreased in mice receiving fluoride. Keeping in view of the facts stated above the author interested to know the relationship between the fluoride exposures at lethal and sub lethal levels and the growth of silkworm in V instar.
RESULTS

In silkworm treated with sublethal dose (4.78 mg/body wt.) of fluoride (Table 9, Fig. 6) a significant decrease was observed. In silkworm treated with sublethal dose of fluoride have also shown a significant decrease in body weight. However, the changes were greater in lethal dose exposed silkworms when compared to sublethal dose exposed silkworms.

TABLE 9

The growth of Vth instar of PMXNB4D2 race of silkworm, Bombyx mori on exposure to different doses of fluoride

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Dose</th>
<th>S.W. weight in grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control</td>
<td>314.79c</td>
</tr>
<tr>
<td>2</td>
<td>Lethal</td>
<td>175.21a (-44.34)</td>
</tr>
<tr>
<td>3</td>
<td>Sublethal</td>
<td>284.36b (-9.66)</td>
</tr>
</tbody>
</table>

* Each value is a mean of eight estimations
** Percentage increase (+)/decrease (-) relative to control is given in parenthesis.
*** Means within a column followed by the same letter are not significantly different (P > 0.5) from each other according to Duncan’s Multiple Range Test.
DISCUSSION

The decrease in the body weight in fluoride treated silkworm suggests the suppression of growth. These results have been supported by the studies of Pellai (1988) and Vijaya Bhaskara Rao A. (1994) who reported that the decreased of body weight and the decrease was dose and time dependent. Similarly, in the present study also the changes in the growth appeared as dose dependent. Heavy metals induce reduction in cocoon and shell weights which could be due to the suppressed protein synthetic machinery and decreased energetic efficiency (Chamundeshwari and Radhakrishnaiah, 1994). Thus it can be concluded that the decreased weight in both lethal and sub lethal treated silkworms might be due to the impaired carbohydrate, protein and lipid metabolisms due to fluoride toxicity.