CONCLUSION AND SUGGESTIONS
The cestode fish parasites studied in the present study include *Bothriocephalus* and *Adenoscolex*. While studying the morphology of these cestodes with scanning electron microscopy, two types of microtriches were observed. The microtriches on the scolex were different from those found on the general body surface. Both the parasites showed a well marked seasonal distribution. The difference in the infection among the different fish species and also among the two fish types, viz., *Schizothorax* and *Cyprinus*, is attributed to life cycle of the cestodes. Different abiotic factors were observed to play important role in life cycle processes. Since the temperature varies in different seasons of the year thus causing variation in seasonal incidence of infection among fishes. Feeding habit seems to be significant factor influencing accumulation of parasites. The presence or absence of intermediate hosts, which affect the transmission of parasites, causes variation in the infection incidence in the fishes.

While observing infection in the intermediate hosts of *B. acheilognathi*, it was observed that the infection was more in warmer months. The infection process was observed to be dependent on two factors: the time of discharge of eggs into water and the effect of water temperature on the rate of procercoid development. On the basis of experimental studies it is concluded that the embryonic development of *B. acheilognathi* was controlled by temperature. This tapeworm
showed slow development at lower temperature and a rapid development at higher temperature.

After studying the relationship between egg density of *B. acheilognathi* and mean number of procercoids it can be concluded that by increasing egg density, mean number of procercoids also increases but up to a specific number only. It is attributed to death of heavily infected copepods, as the death of these copepods resulted in a decrease or leveling of the means, or due to failure of coracidia to penetrate the intestine of copepods and might be passed out of the host. The present study confirms that the host mortality increased with the increase in egg density. Also a negative relationship was observed between the egg density and the size of procercoids. This demonstrated that the growth of procercoid is density dependent.

It is concluded that *B. acheilognathi* in natural conditions takes about one year to complete its life cycle. According to results of the present study, recruitment of fish hosts takes place from late spring to midsummer, when the intermediate hosts showed higher levels of *Bothriocephalus* infection. After infecting the final host, they develop and grow in summer and autumn and most of the worms obtained in autumn were fully mature with gravid segments. Intermediate host started showing infection from April i.e., during spring and the infection showed increase, reaching a peak in mid-summer. The present observations suggest that *B. acheilognathi* overwinter in the egg stage.
Conclusion and suggestions

From the present experimental study, it is evident that *B. acheilognathi* needs less than five months to complete its life cycle at a temperature range of 23-25°C. The difference in the duration of completion of life cycle under natural and experimental conditions might be due to difference in a number of factors and is particularly attributed to the effect of temperature on the rate of development. As under natural conditions there could be very low temperature for certain period of time under which no development occurs; thus causing increase in the duration of time for completing life cycle. Also the presence or absence of intermediate hosts under natural conditions effect the life cycle completion.

SUGGESTIONS

Life cycle study of parasites is one of the important areas of analysis. Although the life cycle of a number of parasites has been elucidated still this field needs attention and lot of work has to be carried out in this field of research. On the basis of observations and conclusions, it is suggested that future work should be focused on the following aspects:

- The morphological identification of parasite species is difficult because of the presence of very few characters available; therefore, the molecular techniques can be employed for morphological identification of different life cycle stages of a parasite.
• The immunological relationship of different stages with their hosts and the mechanisms by which they are able to survive in the hosts could be worked out.

• The specificity of parasites to their intermediate and final hosts can be studied experimentally.

• The differences in maturation and fecundity of different parasites in different host species could be studied to determine their host suitability.

• Effect of host sex on the parasitism and life cycle of parasites.

• The mechanism of penetration of larvae into different tissue sites and also the factors controlling growth and sexual differentiation of adult parasite can be explored.

• Studies could be focused on the biochemistry of various species at different stages of development in different hosts or habitats.

• The variation in life cycle study of fish parasites in different water bodies.

• The effect of age of fishes on the life cycle of parasites.

• Variation in the parasitism and life cycle of parasites in eutrophic and oligotrophic water bodies.