

1. INTRODUCTION

Endocrine functions of the vertebrates, in addition to continually assisting to adjustment of metabolic events, usually exert a prominent role either in adjusting the animal to a particular type of environmental condition or in preparing it for reproduction. piscine reproduction is a complex and intriguing phenomenon. Several factors are said to influence this process. Although the role of pituitary in the control of reproduction in fishes has been well documented, yet no clearcut information is available upon the influence of thyroid on reproduction in these species. In mammals, thyroid is shown to be essential for the proper functioning of the gonads but in fishes the role of the gland in reproduction is difficult to elucidate.

A few investigations on thyroid control of reproduction in fishes tend to conflict. Numerous studies indicate a relationship between thyroidal and gonadal functions in fishes under various physiological conditions (Berg et al., 1959; Dodd and Matty,

1964; Gorbman, 1969; Singh, 1970; Sage, 1973; Etkin and Gona, 1974; Eales, 1979; Matty, 1985; Cyr and Eales, 1988a). Evidence to support this view comes from studies of seasonal correlations between thyroid and sexual activities (Ball, 1960; Honma and Tamura, 1965; Singh et al., 1974; Osborn et al., 1978; Pickering and Christie, 1981; Ueda et al., 1984; Cyr et al., 1988a; Lal and Srivastava, 1990a) and from experimental manipulation of thyroidal status which alters the reproductive functions. Experimentally induced hyperthyroidism by administration of thyroid hormone accelerate (Hurlburt, 1977; Cyr and Eales, 1988a) and hypothyroidism by chemical or radiothyroidectomy inhibit the gonadal development (Belsare, 1965; Pandey and Leatherland, 1970; Srivastava and Gathyanesan, 1971; Oshima et al., 1972; Mukherjee, 1975; Cyr and Eales, 1988a).

Although in teleosts, TSH and gonadotropin have evolved as distinct hormones, the controls over these hormones remain closely linked together (Sage and Bern, 1971). Therefore, thyroxine exerts a direct negative feedback on both TSH and gonadotropin cells (Sage and Bromage, 1970). It indicates a very close relationship between the control of thyroid and control of gonad.

It is likely that the observed relationship between thyroid and reproduction is due to the effect of gonadal hormones on the thyroid rather than the thyroxine affecting reproduction. Hence, this alternative also needs to be examined. Sex steroids influence thyroid activity in teleosts (Sage and Bromage, 1970; Singh, 1978; Chakraborti and Bhattacharya, 1984; Cyr et al., 1988b). Removal

of the gonads inhibit thyroid function in terms of low plasma T_4 level and thyroid peroxidase activity which effectively reversed after sex steroids administration (Chakraborti and Bhattacharya, 1984; Chakraborti et al., 1984). The possibility that thyroxine influences reproductive function is reported by the evidence that thyroidectomy or treatment of fish with antithyroid compounds inhibits gonadal development and the degenerative changes which occur in the ovary of captive sturgeons can be reversed by thyroid treatment (Ball, 1960). Thus, there may be a reciprocal effect, the gonadal hormones modifying thyroid activity and the thyroid influencing reproduction. It appears that these two interesting activities are inextricably interwoven.

In view of the above facts, it was thought pertinent to explore the interrelationship between thyroid and gonads in more teleostean species before any generalization could be drawn. Hence, in the present investigation an attempt has been made to clarify the possible role of thyroid gland in relation to ovarian maturation and also the influence of sex steroids on thyroid activity in a freshwater teleost, Heteropneustes fossilis (Bloch). Since, liver is one of the vital organ for different metabolic processes (Petersen and Ummersen, 1977), it was therefore, decided to study the changes in liver also alongwith thyroid and ovary. This study has been attempted under the following programme.

1. Studies on the annual variations in thyroid gland, ovary and liver of Heteropneustes fossilis.
2. Effects of thyroid hormone on ovary and liver of Heteropneustes fossilis.
3. Influence of sex steroids on thyroid gland, ovary and liver of Heteropneustes fossilis.