Introduction

Endocrine control of fish reproduction has been a major centre of interest in the field of endocrinological study during the last three decades. This is principally regulated by hormones from the brain, pituitary and gonads. Pituitary gonadotropin (GTH) is released under the influence of gonadotropin releasing hormone (GnRH), a decapeptide secreted by brain and reaches its target organ- ovary or testis via the circulatory system. GTH binds to its receptors present in the follicular layers of the ovary or testis, results in the production of steroid hormones. These eventually cause the growth and development of gonad as well as maturation of gametes.

Over the last several years, a series of studies in many laboratories using several fish species including hilsa, salmonid, goldfish, medeka, zebra fish, amago salmon, rainbow trout, coho salmon as experimental animal and provided varieties of information on the hormonal regulation of oocyte growth and maturation Diversity is found regarding the nature of maturation-inducing steroid (MIH). In most of the teleost 17,20 β -P is considered to be the potent MIH, whereas in sciaenidae family another steroid 17 α ,20 β ,21-trihydroxy-4-pregnen-3-one (20 β -S) has been reported to possess MIH property. Yet in some teleosts corticosteroids also have been considered to be the most effective steroids in this purpose.

Furthermore, being an important part of the aquatic food web, fish are more susceptible to any toxicant released in water body. Reproductive dysfunction is always linked to endocrine alterations as the reproductive cycle of fish is regulated by the endocrine system. Mercury contaminates the natural aquatic ecosystems through the disposal of mercury-containing products and exists in the environment. A limited number of reports are available on mercury toxicity in fish, which induces us to perform both in vivo and in vitro experiments to assess how mercury induces reproductive impairment in fish.

The present thesis is designed to provide some new information about the reproductive biology of *Trichogaster fasciata* and provide concise, yet authoritative coverage of the role of seasonal fluctuation of FSH, LH and different steroid hormones throughout the year depending on the ovarian developmental stages. Thesis also included a thorough study on the hormonal regulation of oocyte maturation in such fish. Finally, an attempt has been made to elucidate the molecular mechanism of reproductive dysfunction influenced by this fish species.

The present thesis contains review of literatures, systemic position of *Trichogaster fasciata* followed by objectives, five chapters, and summary of the whole thesis work and a list of references cited. Chapters where experiments with results are incorporated ended with a discussion supported by a bulk of currently available evidences.

Systemic position of *Trichogaster fasciata* comprises identifying characters, common name, distribution and breeding habit of this species.

Chapter-I demonstrates the annual profile of plasma follicle stimulating hormone (FSH), leutinizing hormone (LH) and their involvement in folliculogenesis of *T. fasciata*.

Chapter-II demonstrates the annual profile of plasma and gonadal steroid in *T. fasciata* and their involvement in oocyte growth and maturation.

Chapter-III describes the *in vitro* steroidogenesis by different stages of ovarian follicles under the influence of FSH, LH and HCG.

Chapter-IV focuses on the endocrine disrupting potentiality of Mercury in T. fasciata.

Chapter-V is devoted to explore the molecular mechanism of mercury induced reproductive impairments in banded gourami, *T. fasciata*.

In the interest of clarity, each chapter, except review of literature, comprises an introduction of the problem, materials and methods, results with numerous illustrations and tables and the detailed discussion of experimental data.

In this thesis we pursued the following specific objectives:

- To investigate the role of gonadotropins (LH and FSH) on the regulation of oocyte maturation and steroid production in *T. fasciata*.
- To document the annual plasma and gonadal steroid hormone profile in relation to gonadotropins level of *T. fasciata*.
- To make a brief account of histological changes, steroidogenic factor 1 level, aromatase activity, P450 arom gene expression pattern of *T. fasciata* after exposed to mercury pollutant.
- > To examine the effect of mercuric chloride (HgCl₂) on *in vivo* release and *in vitro* production of steroids by the ovarian follicles stimulated by gonadotropins in *T. fasciata*.
- To estimate *in vitro* effects of this pollutant on gonadotropin-induced oocyte maturation in *T. fasciata*.

I hope the concise and abundantly illustrated format of the chapters with a summary at the end will make this work useful for the students and scientists who want to know more about this exciting field of research.