Reproductive biology of the guitarfish, *Rhinobatos hynnicephalus*

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**Synopsis**

Reproductive biology of the guitarfish, *Rhinobatos hynnicephalus*, from Xiamen coastal waters is described. Males have two functional testes. Spermatogenic cells in different seminiferous follicles are at different developmental stages while those in the same follicle are at the same stage. The development of claspers suggests that males mature at 380-400mm TL. Females mature at 390–440mm TL. Both ovaries are functional. The first generation of ovarian eggs reach mature size when 22–24mm in diameter in April or May. The subsequent crop of eggs is ready for ovulation when the intrauterine embryos reach full term. The guitarfish is aplacentally viviparous. Longitudinal folds were observed on the internal wall of the uterus. Gestation takes one year and parturition takes place in June or July. Fecundity ranges from 2 to 9, with the large females usually being more fecund. Of 29 embryos ranging from 52–157mm TL, there were 15 females and 14 males indicating an embryonic sex ratio 1:1.

**Introduction**

The guitarfish *Rhinobatos hynnicephalus* Richardson, is a warm water benthic species distributed in the East and South China Sea, South Japan and Southwest Korea (Zhu 1960). This species is caught throughout the year in the coastal water of Fujian, Southeast of China. There have been no reports on the reproductive biology of this fish, but Lessa (1982) has reported the biology and population dynamics of *Rhinobatos horkelii* from Brazil (cited from Martin & Cailliet 1988). The purpose of this study is to provide information on the reproductive system, embryonic development, maturity, fecundity and sexual cycle of the guitarfish.

**Materials and methods**

Specimens of guitarfishes were collected monthly off Xiamen, Fujian from April 1987, to April 1988. The principal sampling devices were commercial gill-net and trawler vessels operated in waters of 30–40m depth. A total of 66 males ranging from 296mm TL to 527mm TL and 161 females from 230mm TL to 622mm TL were examined. All specimens were sexed and measured immediately after being caught. Total length, disc width and disc length were measured to the nearest 1mm. Weight was taken with a scale accurate to 5.0g. Maturity in males was determined by observing the sudden increase of clasper length. Maturity in females was determined by the size of ovarian eggs and the condition of the oviducts. Mature females had large ovarian eggs 22–24mm in diameter and slightly enlarged uteri. Mature or reproductive females had fertilized eggs and/or embryos in the uteri. Recently post-partum females had flaccid and stretched uteri. Gonads, oviducts, oviducal glands and uteri of different developmental stages were removed and
preserved in Bouin-Hollande fixative, embedded in paraffin and sectioned at 8-10 μm. Specimens were preserved in 10% formalin for dissection. Embryos and the largest ovarian eggs were counted and measured. The sexual cycle and gestation period were estimated by comparing the growth of eggs and embryos in various months of the year. Five embryos at different total lengths were chosen to describe the developmental morphology.

Results and discussion

Male reproductive system

Testes. - The testes in male *R. hynnicephalus* are paired, elongate, dorsoventrally flattened organs which are attached along either side of the vertebral column by a mesorchium (Fig. 1). Both testes are well developed and functional in adult males. Depending on the size of the adult, the testes range from 40 to 60 mm in length, 10 to 15 mm in width. The epigonal organs entirely envelope the ventral surface of the testis as a thin layer. The tips of the epigonal organs extend beyond the testis. From the dorsal view of the testes, 20–28 whitish spherical lobules can usually be seen. Microscopic examination of the testes demonstrates that the lobules are separated by connective tissue and each of them has a number of spherical seminiferous follicles in which spermatogenic cells are developing. Spermatogenic cells within a single follicle are at the same developmental stage while those in different follicles may be at different stages. The cells in follicles close to the epigonal organ side are at a more advanced stage than those in follicles located further from the epigonal organ (Fig. 2a). This observation is similar to that found in Aleutian skate, *Bathyraja aleutica*.