

ZEBRA FISH- GENERAL BIOLOGY AND A BIOMEDICAL RESEARCH TOOL

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Abstract. Zebra fish, scientifically termed as *Danio rerio* is an inhabitant of freshwater of tropical regions. It belongs to minnow family (Cyprinidae) of order Cypriniformes (Rainer and Pauly, 2007). It generally is an ornamental fish which finds itself in different aquariums and very much in use in scientific and human biomedical research as model organism.

Keywords: Freshwater; Ornamental fish; Scientific research; Zebra fish

INTRODUCTION

Zebra fish is an inhabitant of Southeastern Himalayan streams and water bodies including the countries of South Asia. It prefers slow flowing and stagnant water bodies for habitation. The fish possesses typical uniform, pigmented, horizontal blue stripes on the body surface from which it derives its popular name. The stripes go throughout the length of its body up to caudal fin region. The shape is fusiform and laterally compressed.

The fish is named for the five uniform, pigmented, horizontal blue stripes on the side of the body, all of which extend to the end of the caudal fin. It is fusiform in shape and body is laterally compressed and mouth remains directed upwards. Female fishes have larger white bellies than males and can grow from 4-7 cm in length. The fish can survive for a span of 3-5 years (Spence et al., 2008). Zebra fish are omnivorous in their feeding habits. It feeds on zooplankton, insects, insect larvae, and phytoplankton. Worms and certain small crustaceans are among its favorite feed (Spence et al., 2008). Nowadays, commercially available transgenic fishes are available which express green, red, and yellow fluorescent proteins. They are commonly known as GloFish, golden, sandy, longfin and 'leopard'. The presence of male fish is required for ovulation and

spawning making the generation time of zebra fish to be 3-4 months. All major organs in the fish start developing from 12-36 h depending on the external temperature and internal condition of the embryo.

For commercial benefit hybridization of various zebra fishes are made available in market like hybrids between *D. rerio* and *D. nigrofasciatus* (Parichy, 2006). Zebrafish is an ornamental fish which is well appreciated in aquariums in ambient temperature of 22-28°C. However, they are also affected with different infections caused by *Oodinium* or velvet disease, microsporidia (*Pseudoloma neurophilia*) and *Mycobacterium* species.

REGENERATION PROPERTY

Zebrafish can regenerate their fins, heart (Wade, 2010) and skin including brain and stem cells in their larval stages. British Heart Foundation in the Year 2011 is investigating through research on how these special features of the fish can be utilized for mitigating various cardiac ailments of human. The researchers make use of the characteristic of this fish to study healing/repair mechanisms in vertebrates.

USES IN SCIENTIFIC RESEARCH

Zebra fish are extensively used in environmental monitoring, estrogen detection and in medical research. The use of zebra fish as model organism for studying and understanding vertebrate development and functioning of genes was first studied by George Streisinger at the University of Oregon (Mayden et al., 2007). Moreover, zebra fish can also be used for studying developmental biology, toxicology (Hill et al., 2005), oncology (Xiang et al. 2009), teratology, stem cell and regenerative medicine and theory of evolution (Parichy, 2006). zebrafish is being used as model organism to study heart failure congenital heart disease, blood clotting and blood vessel development in vertebrates. Zebrafish stem cells can be used in treatment of human blindness, macular degeneration, glaucoma, and diabetes-related blindness and eye care by injecting them in the eye to treat diseases that damage retinal neurons.

Zebra fish can be used as convenient model for research and scientific investigations (Spence et al., 2008). The fully sequenced genome, well understood

development characteristics and rapid embryonic development in zebrafish are some of the vital features which make it a convenient model in human genomic research.

Zebra fish is an important research tool for studying the gene expression and gene sequencing in vertebrates including mitochondrial DNA and pigmentation gene. Gene function in zebrafish is investigated by method of transgenesis using the Tol2 transposon system (Kawakami et al., 2004).

SUMMARY

Zebra fish is an ornamental fish which finds its wide application in wide scientific and biomedical research for its unique developmental and biological characteristics.

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