

# The Fish

(*Danio rerio*)

“Do not tell fish  
but

Small, tropical zebrafish, native to southeast Asia, have been recruited relatively recently from the pet shop and into the lab. They are easy to look after and breed prodigiously. External fertilization allows easy genetic manipulation and analysis, and the embryo is optically transparent. In addition, the availability of a vast storehouse of mutations means that this model will provide insights into developmental processes for years to come.

## Stats

**Size:** 3 cm long

**Diet:** Brine shrimp and algae

**Life span:** ~5 years

**Reproduction:** Eggs  
fertilized externally

**Development:** Transparent  
embryos develop to adults in  
3 months

**Average clutch size:** 200

## Web Sites

**Zebrafish Information Network:** [zfin.org](http://zfin.org)

***Danio rerio* Sequencing Project:** [www.sanger.ac.uk/Projects/D\\_rerio](http://www.sanger.ac.uk/Projects/D_rerio)

**Trans-NIH Zebrafish Initiative:** [www.nih.gov/science/models/zebrafish](http://www.nih.gov/science/models/zebrafish)



Illustration: Tammy Irvine, Rear View Illustration

**Late 1960s**  
George  
Streisinger begins  
work on zebrafish

**Mid-1970s**  
Techniques for  
producing  
homozygous  
diploid offspring  
developed

**1970s**  
Mapping and  
linkage studies  
initiated

**1982**  
Charles Kimmel  
describes  
morphology  
and arrangement  
of early embryonic  
neurons

**1982**  
Streisinger clones  
the first vertebrate,  
a zebrafish

**1980s**  
Mutagenesis  
regimes  
reported

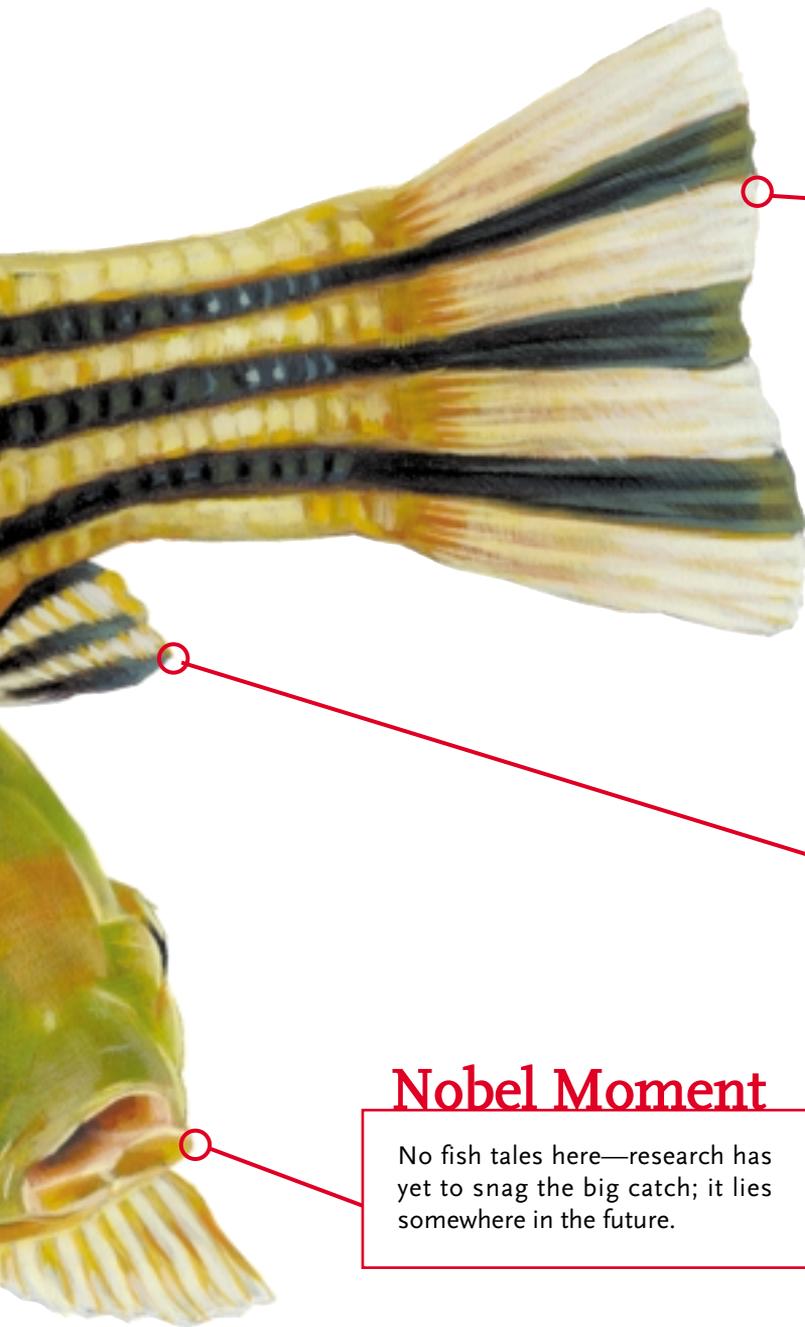
**1989**  
*spadetail* embryonic  
lethal mutation first  
described

**1990**  
First  
zebrafish  
conference

**1990**  
Robert Ho  
and Donald  
Kane use cell  
transplantation  
to generate  
genetically  
mosaic embryos

stories where the people know you;  
particularly, don't tell them where they know the fish.”

—Mark Twain (1835–1910)



## ‘Omics

**Genome size:** 1,700 Mb

**Chromosomes:** 25 diploid  
(unlike many other fish)

**Number of genes:** Currently  
being sequenced

## Feature Technology

**GFP:** Green fluorescent protein (GFP) spontaneously fluoresces. It can be linked, via either the N- or C-terminus, to a broad range of proteins that retain their functions, and it can be expressed as a transgene. This terrific flexibility makes GFP an ideal noninvasive marker in living cells. In zebrafish, GFP can follow internal development because they are translucent. Recently a photoactivatable variant that provides a 100-fold increase in signal intensity has been developed, providing still greater utility.

## Nobel Moment

No fish tales here—research has yet to snag the big catch; it lies somewhere in the future.

1993

Christiane Nüsslein-Volhard, Mark Fishman, Wolfgang Driever begin “Big Screen,” the systematic production of embryonic lethal mutations

1994

*no tail* is first mutation identified molecularly

1996

“Big Screen” completed

1997

Trans-NIH Zebrafish Initiative launched

1998

*one-eyed pinhead* is first mutation positionally cloned

2000

Genome sequencing project announced

2000

Morpholinos used to knock down gene expression

2000

Second mutagenesis screen gets underway

2002

Wellcome Trust Sanger Institute posts first draft of genome online