Life Science

GloFish™ Fluorescent Zebra Fish

Will Martin
Living Zoology Department
Carolina Biological Supply Company
Alan Blake
Chief Executive Officer
Yorktown Technologies, L.P.

Biotechnology, DNA structure and function, the use of transgenes, environmental science, and model organisms are all topics that can appear abstract and difficult to students. Using GloFish™ as a visible, real-world example, students may grasp these concepts more easily. Comparing wild-type zebra fish behaviors, requirements, and fitness with those of the GloFish™ offers a straightforward research-based project for students. Having a genetically modified animal available for observation allows you to introduce genetics-based topics more easily.

Background

GloFish™ are a great classroom teaching tool for introducing the topics of genetic modification and bioethics. These are especially timely topics, given the recent rise in genetically modified (GM) crop use. Last year, approximately 8.25 million farmers in 17 countries planted some variety of GM crops. The United States is the world's leader in GM plantings, with 85% of the soybeans, 76% of the cotton, and 46% of the corn seeds planted harboring genetically engineered improvements that confer insect, disease, and/or weed resistance.

The United States has also approved the commercial planting of canola, chicory, flax and linseed, melon, papaya, potatoes, rice, squash, sugar beets, tobacco, and tomato GM crops. The power and promise of biotechnology is clear, but the scientific community must cooperate with educators and legislators to inform the public and to create an appropriate code of ethics for this tool.

Next >>

carolina@carolina.com
Phone: 800-334-5551
Fax: 800-222-7112
Our site is best viewed using the latest version of Internet Explorer or Firefox.

- Printer-friendly version
- Recommend this page to a friend or colleague
- Subscribe to our email newsletters

Life Science

GloFish™ Fluorescent Zebra Fish

Will Martin
Living Zoology Department
Carolina Biological Supply Company
Alan Blake
Chief Executive Officer
Yorktown Technologies, L.P.

Page 2 of 3

New teaching tool

You may already be familiar with GloFish™ fluorescent fish, as they have received worldwide attention from the front pages of prominent newspapers and from nationally syndicated radio and television shows. Now you can enhance your classroom aquarium and capture your students' attention with these new "glowing" freshwater fish!

Carolina Biological Supply Company has partnered with Yorktown Technologies to bring GloFish™ fluorescent zebra fish to your classroom. This exciting new organism obtains its red fluorescence from a sea anemone gene. It is the first genetically modified pet available to consumers.

The zebra fish (Fig. 1) has been used as a laboratory model organism for over 50 years, but its use in developmental studies has recently exploded because it is inexpensive, nonaggressive, easy to breed, and small—yet still large enough for embryological studies. Zebra fish have also been a favorite of freshwater aquarium owners for years because they are active, hardy, easy to maintain, and are very compatible with other community fish.

Figure 1 Wild-type zebra fish.

The development process

The fluorescent GloFish™ was originally developed as a tool to test water quality. The idea was to engineer a genetic "switch" that would allow the fish to fluoresce in the presence of certain levels of toxins, such as heavy metals. The "switch" is still in development; however, constantly fluorescing zebra fish have been successfully produced. When viewed with a traditional white aquarium light, these fish appear bright red when compared to their wild-type counterparts.

Figure 2 Microinjection with fluorescent protein

The development process begins with the construction of a fluorescent protein gene construct. This construct includes the fluorescent gene and a promoter that indicates when and where the gene will operate. The construct is amplified with some help from bacterial cells. The bacteria take up the construct and produce more of it each time a bacterial cell divides. Once the construct is present at high enough levels, it can be purified from the bacteria and introduced into the zebra fish.

gene construct.

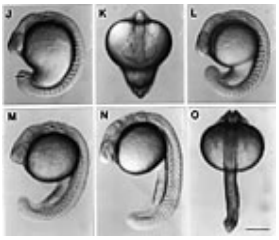

Figure 3 Embryonic development.

The construct is introduced via a process known as microinjection (Fig. 2). The construct is injected into a newly fertilized embryo, which then expresses the fluorescent gene once grown. In a small percentage of cases, the construct is incorporated into the animal's germ cell line, so that it will pass the construct along to its offspring. The transgenic fish will develop normally otherwise (Fig. 3). These offspring can then be used as a progenitor of a new line of fluorescent fish (Fig. 4).

Figure 4 Biotech Fish! This fish will pass the construct to offspring.

<< Previous **Next >>**

Online catalog | Science & math pages | Teacher resources | Site map | Customer services | Home

carolina@carolina.com
Phone: 800-334-5551
Fax: 800-222-7112

Our site is best viewed using the latest version of Internet Explorer or Firefox.

- Printer-friendly version
- Recommend this page to a friend or colleague
- Subscribe to our email newsletters