

# nature biotechnology

## The one that got away

**Y**ou may not have noticed, but transgenic fish made a big splash last month. GloFish—a brand of transgenic zebrafish that fluoresces red under ultraviolet light—are currently on sale in ornamental fish stores in selected US states (p. 11). GloFish is not only the world's first genetically engineered pet; it is also the first transgenic animal to be sold to the public. Sales are reportedly brisk, reflecting genuine consumer demand. But what really makes this fish special is that it has managed to completely elude the US regulatory system.

Yorktown Technologies, the Texas company that distributes GloFish, made considerable efforts to contact relevant federal agencies for regulatory oversight. In each and every case, however, the corresponding agency—the Environmental Protection Agency (EPA), the Department of Agriculture (USDA) and the Fish and Wildlife Service—claimed the fish lies outside its jurisdiction. Even the Food and Drug Administration (FDA) has turned down the offer, although it is currently in the process of evaluating the safety of another transgenic fish—an Atlantic salmon destined for dinner plates that constitutively expresses salmon growth hormone.

In December, the FDA announced that it had no intention of regulating a tropical fish not destined for human consumption. “In the absence of a clear risk to public health,” it stated, “the FDA finds no reason to regulate these particular fish.” This view chimes with common sense, even though it rather conflicts with earlier statements from Lester Crawford, the FDA's deputy commissioner, who had suggested the agency would regulate *all* transgenic fish—whether or not they were destined for the dinner table or the home aquarium.

So GloFish are now swimming around in tanks in pet stores and homes across the continental United States. The first genetically engineered Christmas gifts have been given (and probably overfed by overeager children or flushed down a few toilets). The GloFish was not subjected to a formal evaluation of their impact on human health or the environment, but here is the sort of thing that an evaluation might have said:

The zebrafish is an ornamental tropical fish. As such, it is unlikely to survive in temperate waters such as those of the continental US. The number of instances of feral, ecologically invasive zebrafish in the United States is zero, despite the power and might of the aquarium business. Furthermore, the lives of ornamental zebrafish—transgenic or otherwise—are physically contained by glassware (the zebrafish, belying its nominal equine connection, is not a good jumper). Red fluorescent protein is not harmful to humans or animals. Neither is there any reason to believe that the expression of red fluorescent protein genes under the control of a muscle-specific promoter (*myl2*) would confer any fitness advantage to a transgenic fish. Red fluorescent protein, though of value in deep marine environments, seems unlikely to confer on the zebrafish, or any organism that is likely to encounter it, any evolutionary advantage or dangerous characteristic. In short, the GloFish is a harmless critter.

Nevertheless, the appearance of unregulated GloFish in the stores does point to a fundamental flaw in US regulations. In Europe, where

the regulatory system trips into action at the mere whiff of a transgene, the GloFish would undoubtedly have been caught in the regulatory net. It would then have been subjected to an escalating series of ludicrous and inappropriate assessments, culminating, no doubt, in a plenary debate at the European Parliament on the degree to which enforced fluorescence erodes a zebrafish's feeling of self-worth or threatens its evolutionary heritage. In the United States, rather sensibly, the system is not triggered by mere transgenesis. Instead, the 1986 Coordinated Framework for the Regulation of Biotechnology divides jurisdiction over biotechnology products among three main agencies: the FDA administers the Federal Food, Drug, and Cosmetic Act for the oversight of food safety, the USDA regulates the safety of meat, poultry and dairy products, and the EPA looks after environmental issues, including pesticides.

The judgment of the various US authorities not to regulate the GloFish reflects a strength of the US system—that products need not be regulated unless they pose some potential public health, human safety, or environmental safety issues. Implicit in the US authorities' non-action with the GloFish, therefore, is a decision that the product is safe. However, while generally laudable, such a *laissez faire* approach will not do in this case. Implicit decisions are not good enough.

The problem is that because no agency has said that it will regulate the GloFish, the perception is that no agency is willing to take responsibility for that kind of product. It appears, at least to a wider public (and perhaps especially to one looking across the Atlantic from Europe), that the GloFish has slipped through the cracks. There will be people out there who believe that the US authorities are all negligent, and jurisdictional uncertainties have led to poor decision making, or worse yet, no decision making. Indeed, the Center for Food Safety has sent a letter to the FDA along those lines, cosigned by the Sierra Club, the National Environment Trust, Greenpeace and the Consumer Policy Institute.

One solution to all this would be the creation in the United States of a Supreme Office of Transgenic Oversight that would take the first look at all transgenic products. SOTO would hand over foods, drugs, agricultural products and so forth to established agencies, such as the FDA, EPA and USDA. At the same time, it would assume responsibility itself for awkward product categories, such as the GloFish.

An alternative solution, and one that requires no additional legislation or regulatory burden, would be for existing agencies to assume full responsibility not only for products that they scoop into the regulatory process but also for those that they wave past. In the case of the GloFish, one agency needs to say—and loudly—“It would be our responsibility to regulate this product if it needed regulating, but we are positively exercising our responsibility in this instance by not regulating.” It could then go on to say why not.

Lord Falkland once famously said, “When it is not necessary to make a decision, it is necessary not to make a decision.” We would counter: “When it is necessary not to make a decision, it is necessary to take responsibility for not taking it.”