

## **Searching for GloFish™: Aesthetics, Ethics and Encounters with the Neon Baroque**

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### **Abstract**

Fluorescent zebrafish are the first genetically-modified animals globally, if unevenly, circulated outside of laboratory environments. GloFish™ were developed in Singapore. They are widely sold as popular pets in the United States, but their public sale is banned in Europe and elsewhere. On the trail of these animals, I trace a fragmentary biogeography through ethnographic encounters in the spaces of scientific research, animal exhibits, pet stores and art galleries, in Europe, the USA and Singapore. At each site, as the colour, light and intensities of neon flicker with the potential for life, and concern for animal lives move in and out of focus, I ask: what is the proper way of knowing and living with genetically-altered zebrafish? To ask the question is to open up a conversation about the changing constitution of science and space, representation and reproduction in relation to these new forms of life. To try to answer it demands attention to a baroque patterning of scientific practices, aesthetic sensibilities, ethical responsibilities and political spatialities. In a discursive arena typically characterised by narratives of linearity – whether of scientific progress or slippery slopes – I suggest the affective sensibilities, theatrical qualities and unresolved elements of the baroque offer powerful, if ambivalent, resources for reflection on the intersection between the animating aesthetics and turbulent ethics of postgenomic life.

**Keywords: genetically-modified animals, aesthetics, ethics, regulation, commodification, baroque geographies**

## Introduction

Enter any large modern biological research facility today and you are likely to encounter an aquarium. Often located in the basement, in a windowless room, multiple racks of small square tanks house increasingly large numbers of small zebrafish shoals. The emergence of zebrafish as experimental animals derives from their value in developmental biology, where their large transparent eggs offer a means of tracking vertebrate embryo development in vivo (Grunwald and Eisen, 2002; Meunier, 2012). The scope of zebrafish research has rapidly expanded with the development of transgenic techniques, with the new visibilities enabled through the insertion of fluorescent proteins and sequencing technologies allowing novel relations to be drawn between cellular processes in zebrafish and a wider range of mammalian species and environmental features.

As well as increasing the instrumental value of these animals, fluorescent proteins bring an alluring aesthetics to this research, attracting new recruits to the field. As one scientist I interviewed suggests, “developmental biology is a very aesthetic subject. I think a lot of people who go into it do it because they find it visually appealing actually. They appreciate the beauty of the organism; the beauty of the preparations”<sup>1</sup>. Many fish facilities emphasise the visual dimensions to their aquatic research through tanks, situated at the reception, featuring vibrantly coloured fish that are not part of experimental procedures. However, few visitors get beyond these public displays. The flow of water around research facilities is closely controlled: for salts, temperature and microbial ecologies. The movement of people in and out of these spaces is similarly managed; for these are scientific apparatus and animals assembled under the auspices of local veterinary control or oversight from national regulators<sup>2</sup>. Yet, the regulation of transgenic

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<sup>1</sup> This paper arises from research funded by the UK Economic and Social Research Council on ‘Biogeography and Transgenic Life’ [grant number RES-063-27-0093]. I had written previously about genetically modified zebrafish as an aside in an editorial on the potential for a ‘geography of monsters’ (Davies 2003). I return to them a decade later as a complement to a larger body of work on the international production and circulation of laboratory mice (e.g. Davies 2013), as a way of exploring the porosities between scientific and public circulations of genetically-altered animals and their affects. This portion of research involved 5 interviews with scientists working with zebrafish in the UK, USA and Singapore, as well as site visits and informal conversations at a scientific facility, public aquarium, several pet stores and an art gallery. As in the previous research, all respondents have been offered anonymity. However, my approach to the empirical material and conceptualization here differs from work on GA mice. The lack of demands for harmonisation across the public circulation of genetically modified fish, the operation of affects in making attachments across space and the powerful position of commercial gatekeepers, means the arena remains riven by unresolved tensions, which I deliberate seek to evoke in the fractured narrative that follows.

<sup>2</sup> Experimental procedures on adult zebrafish (including genetic modification) in the UK are regulated through the Animals (Scientific Procedures) Act 1986 meaning that work with these animals requires

zebrafish outside of laboratory spaces is complicated, even baroque. These small, fluorescent fish are the first genetically-modified animals globally, if unevenly, circulated outside of laboratory environments, bringing with them a complex spatial patterning of the interplay and interruption between the aesthetics of fluorescence and the ethics of animal research.

This paper argues the changing visual cultures of science are a vital part of this reconfiguration of biological experimentation, commodification and regulation. This claim can be given context through accounts of a shift from earlier genetic technologies, with their static structure-orientated images of life, to the proliferation of the postgenomic sciences (Franklin, 2006; Sunder Rajan and Leonelli, 2013). This postgenomic turn, Landecker argues, “was and is a thoroughly visual turn” (2012, p.278), reopening questions of how we see, imagine, animate and manipulate life, following the century of the gene (Keller, 2009). If the structural architecture of the double helix, the replicating qualities of DNA, and the cultural dread of the clone accompanied earlier interfaces between the scientific and popular cultures of genetics, the postgenomic turn has a different visual vocabulary. This is one characterised by forms of live-cell image-making, which use fluorescent proteins and probes to place molecular and cellular mobilities centre stage. Postgenomics is accompanied by the rise of a fluorescent aesthetic. “Molecules lit up like strings of Christmas lights, trailing their fluorescent tags around as they go about” (Landecker, 2012, p. 379) capture the attention of scientists, making context specific and ever more complex patterns of gene expression visible. These new visualities provoke the search for new vocabularies to connect this increasing awareness of movement to the complex patterns of biological causation. As one scientist suggests, growing appreciation of the net of interrelations between gene, cell, organisms and environment, means “we’ve reached a stage where the mapping from genotype to phenotype is getting a bit on the baroque side” (Khan, 2011). If the epistemic and ontological commitments of earlier genetics were signalled by the wide circulation of the iconic structure of the DNA molecule, postgenomics seems to be taking us towards the complex aesthetics of the neon baroque.

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establishment licences, project licences and personal licences. Recent changes have aligned UK legislation with European Directive 2010/63/EU in the UK, requiring additional registration for breeding and supply. The circulation of genetically-modified zebrafish in the UK is controlled through EU directives on the ‘contained use’ and ‘deliberative release’ of genetically-modified organisms into the environment. In the USA, publicly-funded biomedical research involving zebrafish is covered by the Public Health Service Policy on Humane Care and Use of Laboratory Animals, which require local Institutional Animal Care and Use Committees (IACUCs) to carry out health checks and implement guidelines to minimise pain and distress. The emerging regulatory situation in Singapore is explained later in the article.



**Figure 1: Danio rerio GloFish, science institute aquaria  
(Photo: Karol Głab<sup>3</sup>)**

Yet, what this might convey outside of the laboratory is more puzzling, for as Landecker suggests, such live cell images have little public presence. The attractive qualities of fluorescence do have resonance, in consumer culture, and through camp and irony, that precede the movement of these scientific images into a public arena. There are literatures here exploring the affective force of ‘neon cages’ as part of the commodity fetish mobilizing consumer cultures (Langman, 1992), occasionally leavened by the rehabilitation of camp to counter the stigma of failed taste and the consumer dupe. The somatic pull of neon light, which enables its use as a marker of genetic processes in scientific practices, is sustained across space, but the meaning of this captivity shifts

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<sup>3</sup> This photograph was taken during Wikiproject LabSnap 2011 organised by Wikimedia Polska Association and hosted by Max Planck Institute for Molecular Cell Biology and Genetics in Dresden (MPI-CBG), which gave the access to its facilities. All photos taken during this wikiproject are to be found here: [http://commons.wikimedia.org/wiki/Category:LabPstryk\\_2011](http://commons.wikimedia.org/wiki/Category:LabPstryk_2011). This image is reproduced here under the GNU Free Documentation License.

outside of the laboratory. In science, fluorescent colours are used to track presence; outside, detailed reflections on this circulation of affects remain absent, even though it is already evident in the apparent appeal of genetically altered zebrafish pets. There are questions of commodification, but there are also questions of taste and critique. If genetics offered structures of meanings, postgenomics seems to be offering affective attachments, whose meanings, drawing on Ranciere (2009), are enmeshed with questions of the distribution of sensibilities, across science and space, lives and life, aesthetics and ethics. The baroque circulations of GloFish™ offer a first place to map the patterns of captivation and their control in the emerging cartographies of the neon baroque.

### **From *Danio Rerio* to GloFish™ and the neon baroque**

GloFish™ are *Danio rerio*, a long familiar aquarium pet and recently established model organism in biology, which have been genetically engineered through the insertion of genes expressing fluorescent proteins, originally extracted from jellyfish or sea coral. The resulting fish fluoresce bright red, green, and orange, and now blue and purple, under ultraviolet light. On first glance, the laboratory origin of transgenic zebrafish seems a long way from the excessive, sensational and theatrical qualities of the baroque. The baroque promises a style and mode of seeing that valorises sensual experience, celebrating embellishment and overabundance, rather than emphasising scientific epistemology or the ethics of animal experimentation. In scientific practice, the aesthetic experiences of genetically-modified zebrafish are managed and linked to ethics through the regulation of research procedures and the distribution of sensation. Laboratory spaces focus the dynamism of fluorescence towards revealing molecular processes, reinforcing Enlightenment commitments to realism in research. The pulsating qualities of fluorescent colours are muted in this context; their attention-grabbing capacities directed by scientific apparatus, regulatory control, and a sense of the proper conduct and aesthetics of science. Within the spaces of the fish facility their visual attraction is directed towards the illuminating practices of scientific research. However, outside the laboratory, the folding of fluorescent marine proteins into the living descendants of another species is an arena of aesthetic turbulence. There is considerable contestation as the spaces of science and spectacle fold into the everyday spaces of pet keeping, animal exhibitions and contemporary art. Here, the aesthetics of genetically-modified zebrafish can be intimate, distancing, engrossing, distracting, open, insincere, excessive or simply kitsch. It depends on your perspective.

These perspectives vary spatially and geographically. The specific transgenic modification in GloFish™ was first developed in Singapore in 1999. This trait was introduced by Dr. Zhiyuan Gong and colleagues at the National University of Singapore, as part of their research on environmental pollution. The first public aquaria exhibiting

GloFish™ opened in 2001, with a specially designed display juxtaposing these animals and their jellyfish kin in an exhibit called ‘Jelly World’, located at Underwater World, Sentosa, Singapore. The animals caught the attention of Alan Blake of Yorktown Technologies, based in Austin Texas, in 2003, who obtained the worldwide rights to market GloFish™. Through an arrangement that articulates the breeding of these tropical fish by 5-D Tropical and Segrest Farms in Florida, their worldwide marketing and distribution via the parent company in Texas, and a patent and trademark agreement that returns some funds back to the laboratories in Singapore, these have become the first widely available genetically-altered pet. Despite this global network, their legal circulation is still limited; though reports of their illegal trade periodically surface<sup>4</sup>.

They are now sold as popular pets throughout most of the USA, but not in California, where state-based restrictions on the release of genetically-modified fish means their sale would require an additional ecological risk assessment. Their sale and public possession is restricted in Canada, Europe and Australia by the regulatory processes required for the release of genetically-modified organisms. There are other genetically-modified fluorescent fish available in Taiwan, Hong Kong, Malaysia and South Korea, but for copyright reasons these cannot be called glofish. The public sale of GloFish™ is also restricted in Singapore, despite their development and early public exhibition here and the fact that copyright agreements still return a proportion of profits to the island.

It would be possible to trace this divergent positioning of genetically-modified zebrafish outside the laboratory, with the aim of adding further interpretative insight to the regulatory cultures and civic epistemologies patterning the interplay of risk and commerce in scientific technocultures. In this vein, the analysis would be a small addendum to the magisterial mappings of Jasanoff’s (2005) *Designs on Nature*. However, to focus primarily on the management of risk and public reasoning in these spatial configurations seems insufficient. There is a sensational quality to debates about the circulation of GloFish™, operating through the experience and command of taste, desire, irony, integrity, plagiarism and the proliferation of life, which is both enmeshed with and excessive to this epistemological attention. The public aesthetics of genetically-modified zebrafish do not submit easily to conceptualisation through the incongruence of political risk calculations. Ways of knowing zebrafish require a more baroque empirical and conceptual sensibility; one responsive to the ways in which narratives, images, archives, absences and aesthetic experiences with animals are enfolded into and differentiated through these encounters.

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<sup>4</sup> Versions of this origin narrative are reproduced on the GloFish™ website <http://www.glofish.com/> (last accessed May 2013). For reports of illegal circulation see <http://www.independent.ie/irish-news/pretty-in-pink-but-dont-splash-out-on-glofish-26544078.html> (last accessed May 2013), and <http://www.spiegel.de/international/zeitgeist/fishy-business-genetically-modified-fluorescent-fish-illegally-smuggled-into-germany-a-472688.html> (last accessed May 2013).

In what follows, I recount ethnographic efforts to engage with the aesthetic experience of these genetically-altered animals, which are simultaneously commonplace and elusive, moving through the spaces of public aquaria, the aisles of suburban pet stores, the exhibits of contemporary art and the laboratories of experimental biology. Tracing their circulating forms reveals the diversity of values, multiple rationalities and complex aesthetic sensibilities at play in these different instantiations of biotechnological relations. There is no singular narrative that can characterise these encounters and relations, across space, time and species. Debates about scientific practice, animal welfare, acceptable experimentation, aquarium aesthetics and artistic intervention are present and absent in different places and contexts. They remain fragmented. These patterns of spatial differentiation are additionally punctuated and interwoven with the temporal foldings of unforeseen emergence and sudden disappearance. In research trying to encounter the sites and spaces of public zebrafish display, my own empirical practices confronted a complex experience of presence and absence, ubiquity and erasure, richness and banality, possibility and failure. There is, I argue, a central absence about the proper way of knowing and living with these new companion species at the heart of these sketches of the neon baroque.

I conclude with some further reflections on this central absence, drawing on the spaces, perspectives and uncertainties inherent in Foucault's (1970) discussion of the baroque, reading the complexities of GloFish™ alongside his analysis of the iconic image of Velasquez's *Las Meninas* (1656). This image offers a way of attending to the ambiguous forms, patterning of sensibilities and intersecting gazes through which genetically-modified zebrafish circulate, as epistemic commitments, forms of representation and powers over life are opened up. It is possible to use Foucault's analysis to push parallels between the European baroque of the Seventeenth century and the destabilisation of authority and property (Foucault, 1970; Deleuze, 1993), and the excessive capacities of these new organisms, whose bodies possess ambiguous aesthetic affects bringing uncertain relations into being. There is a connection here between the vocabulary of the baroque as a way of attending to non-coherence and non-possible complexity (Kwa, 2002; Law, 2004), and the baroque as signal of historical-cultural-biological-technological change as questions around the making and unmaking of bodies and relations in the field of life and the living are opened up once again (Munster, 2006; 2009). The generation of new mutations and new modulations around these animals allow the identification of complex biological genealogies and topologies in the production of surplus life (Cooper, 2008), which are enmeshed in the speculative logics of the bioeconomy (Sunder Rajan, 2006).

These conceptual and methodological impulses towards the baroque, and their associated spatial and temporal resonances, are also being explored by geographers (Dixon and Ruddick, forthcoming), in science and technology studies (Kwa, 2002; Law, 2004), in digital and bio artistic production (Murray, 2008; Munster, 2006), and as an ethnographic iteration in anthropological method (Marcus, 2007). I argue these echoes are also useful for opening to the unfolding spatialities of genetically-altered zebrafish. Yet, whilst instructed by them, this form of analysis cannot simply recapitulate an earlier baroque. To suggest so would be a betrayal of the unsettling sensibilities of the baroque, especially as terrains of enquiry exceed the courtly power plays of the European elite, reaching into the representational spaces of scientific, regulatory, commercial and artistic practice in Europe, America and Asia. The baroque as a conceptual category that uneasily straddles aesthetics, philosophy, popular culture and social theory vibrates discordantly in these differently locations, from the affirmative openings of Deleuze (1993), the historic fractures of Benjamin, to the anamorphic orientations of the postcolonial baroque. Yet, despite this polymorphism, I conclude the baroque is still of value in that it signals an epistemic and ontological shock operating through and between different affective encounters with these vibrant animals, drawing attention to a frustrating absence, which cannot simply be explained through an historical analysis of changing attitudes to nature or the comparative study of biotechnology.

### **Underwater World, Sentosa Island, Singapore**

It is a busy public holiday in Singapore, Hari Raya, marking the end of Ramadan. Everyone seems to be out in the shopping centres and at the beach in Sentosa, where there is a queue for Underwater World. I wait first for a ticket, and then for entry. This was the first public aquaria in the world to exhibit the genetically-altered zebrafish now known as GloFish™. Inside, Underwater World is a smaller venue than I expected; unusually for Singapore it now feels rather old. The exhibits jostle together, a sense exacerbated by the large groups that move around each other searching for the best angle from which to view or rather photograph them, their voices bounced around by the hard surfaces of the aquaria. The wall displays hint of organized educational activities and posters made by local schoolchildren remind us there are serious issues of climate change, overfishing, marine pollution, and reef destruction to consider. However, today it is a holiday and a place to amble, to take snap shots, and have a social experience with friends and family. Everyone is taking images with small high-resolution digital cameras. The favoured spot to photograph companions is in front of the tank of colourful reef fish or beside the swirling shapes of jellyfish. In a circular tank somewhat resembling an industrial washing machine, jellyfish slowly rotate, a changing pattern of coloured ultra-violet light picking out their fluorescence. They look otherworldly, part lava lamp, part

extra terrestrial. However, their unlikely genetic kin, the fluorescent *Danio rerio*, are nowhere to be seen.

I ask the young women at the small information desk upstairs. I tell her they used to have these fish here, and I have an interest in them. She asks me to write down the name, and says she will try to find a diver to ask. I write down the various possible permutations: zebrafish, *Danio rerio*, GloFish™. Several minutes later, she comes back. It is just too busy today, and she cannot find anyone to give me an answer. She gives me a brochure, so I might follow up later. It has a helpline number offering generic information on opening hours and special events. I join the crowds to take a photograph of the jellyfish instead and leave.



**Figure 2: Fluorescing jellyfish at Underwater World, Singapore  
(Photo: author<sup>5</sup>)**

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<sup>5</sup> This photograph had its own after-life as a circulating form. The Guardian Weekend Magazine was running a competition for reader's photographs on the theme of colourful on the day I returned from Singapore. In a haze of jetlag I submitted this image, forgot about it, and woke one morning to find it reproduced in the magazine and online.

Once back on the main island of Singapore, I decide to explore further online. Despite some considerable fanfare about the opening of the new Jelly World exhibit in the *Strait Times* in May 2001, I can find nothing about their subsequent disappearance<sup>6</sup>. I go back to research respondents, with whom I have been discussing the development of the institutions and regulations for laboratory animal care in Singapore, to see if I can find an explanation to what has happened to the GloFish™ at Underwater World. One individual explains to me that Underwater World was asked to remove the exhibit by the government body charged with safeguarding the health of animals and plants in Singapore: the Agri-Food & Veterinary Authority or AVA. Her email is a looping narrative of the complex temporalities of regulatory activity, mixing past-presents, future-presents, recollections and simultaneities into one short paragraph. She explains:

‘AVA has always been very strict on the public display of live GM organisms. To date, no live GMOs have ever been approved for sale in Singapore. In any case, a permit is needed for public display. My recollection is that they have requested Underwater World to remove the exhibit, as they did not apply for such a permit. At the same time, since it is public display, it would be necessary to apply to GMAC<sup>7</sup> (Release subcom) for approval.’ (Singapore Scientist and regulator, personal communication, Sept 2009)

This story about the absent presence of a genetically-modified organism temporalizes the spaces of biotechnological regulation, bringing questions about the proper authority over these forms of life in and out of focus. The scientist recollects. An organisation that postdates the organisms’ development and exhibition has always forbidden their display. To date there have been no approvals, but to temporalize such a negative is of course to leave the future open. Their authority is unquestioned, but at the same time, another body would need to be consulted. The agencies involved seek to impose their power through this redaction, but the effect is not merely a simple abstraction. As Neal White suggests, “under the effect of redaction’s cover-up, truth finds itself potentially multiplied [...] To redact is not only to remove information from circulation, possibly indefinitely, but also and more crucially to introduce time into language: the redacted information lingers

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(<http://www.guardian.co.uk/lifeandstyle/gallery/2009/oct/10/readers-pictures-colourful>). I briefly traced the trajectory of its neon form, finding it picked up in a fashion blog, the clashing neon colours re-contextualized to convey something very different from its original frustration.

<sup>6</sup> This visit took place in later 2009. Underwater World was re-opened following refurbishment in 2010. The opening of Jelly World was reported by How Hwee Young, *The Straits Times*, 25 May 2001, pages 2 and 18.

<sup>7</sup> The Genetic Modification Advisory Committee. The committee first met in 1999 to consider the safety and labelling of genetically modified organisms. It was established to build the international regulatory infrastructures which would enable companies based in Singapore’s growing biotechnology industry to penetrate global markets. Considerations of release only initially covered GMOs used in farming and food production, but were later extended in the case of the genetically modified glofish.

unseen, hampering language's assumed transparency and spurring the imagination to circumnavigate the occluded areas in order to reconstitute, bit by bit, the voided meaning."<sup>8</sup> What is redacted here is not language, but life; even so the effect is similar. To pause on redaction is not just to identify the authority to remove these organisms, but to invite reflections on the evolving aesthetic sensibilities, political subjectivities and forms of life and living enmeshed in the now voided meaning.

### **Petco, Denver, Colorado, USA**

In the USA, there is no particular drama in going to a local pet shop and purchasing a small genetically-altered *Danio rerio*. They cost around six dollars and are stocked in most major pet stores. They are sold with minimal fuss, and depending on the staff around, little discussion of their ethics or origin. The story here is one of increasing ubiquity. However, this saturation does not make it easier to research the circulation of commercial, state and public sensibilities around these animals. Proprietary concerns, the lengthy negotiations preceding their approval for sale and the continuing media controversy means approaches to YorkTown Technologies and Segrest farms yield little more than company statements. Contacts with regulators are similarly unrewarding. The regulation and distribution of genetically-modified zebrafish is not an issue these individuals and institutions want to reopen, or at least not with me. Tracking downstream, I follow these animals to their sites of sale instead, combining visits to US conferences with moments of fieldwork in nearby pet stores. Yet even here, in this unlikely ethnography of an everyday companion, these encounters are strangely partial. It is easy to conclude that culture has become nature, rendering these fluorescent animals strangely invisible.

On the outskirts of Denver Colorado, I enter a Petco and walk towards the back of the shop. Like many other pet stores it has an aquarium at the rear, guiding those who want to look at the animals through displays of more static stock. The area itself is dimly lit, giving centre stage to the fish, picked out by lighting effects and aquarium landscaping. The muted colours of freshwater fish predominate. They are easier to manage than saltwater aquaria. But alongside tanks of guppies, tetra and goldfish, I see the electric colours of the elusive glowing zebrafish. I pause, expecting some kind of epiphany from my first encounter with a genetically-modified animal on public sale. I am approached by a sales assistant, who asks if he can be of service. Again, I explain I am interested in these animals, and invite him to tell me more about them. His initial response is not very illuminating. They are fish that glow, he says. I try to open a conversation about risk, regulation and genetic modification, but this doesn't go very far. I am directed back to the

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<sup>8</sup> Neal White, *The Redactor*, available from <http://o-o-e.org/exp-redactor.html> (last accessed May 2013)

GloFish™ website for more information. I try a different tack, and ask what it means to have a fish that glows. This opens the way to a more expansive conversation about the aesthetic qualities of aquarium animals, illustrating how their neon sensibilities take flight.



**Figure 3: Glofish**  
(Photo: <http://www.glofish.com/photos.asp>)

GloFish™ make a more active aquarium he suggests. The animals attract the particular interest of children, and importantly keep their engagement too. They animate the aquarium, so the whole installation can become a stage set for experiments with light and sound for older owners too. The paraphernalia for sale attests to this, with specially designed tanks, lights, gravel, ruined buildings (highlighted with fluorescent paint) and even glowing plants, offering endless options for the personal arrangement of animal display. He tells me to take a look on the internet to see how people curate the space and temporalities of their tanks. Back at the hotel I trawl youtube for these personalised living light shows. Some are a careful technical walk through of the process of setting up of a new GloFish™ tank. Others offer a more dynamic theatrical performance, with dramatic transitions from normal spectrum to black lighting, marked by shifting sound tracks.

Here, on message boards and comments, there are discussions about the desirability of these animals<sup>9</sup>. There are some concerns about ethics. Yet, once it is determined the fish are not dyed, many of these concerns are quietened. More vociferous are debates about taste: whether naturalistic tanks, offering an experience that is true to life, are better than glowing aquaria, which are said to offer an experience that is full of life. Frustrations surface too about the commercial restrictions on reproducing these animals in your own home. To curtail your creativity and the animal's generative potential appears to be at odds with the lively possibilities and the potential for temporal experimentation these animals provide. Discussions about the patenting of life and restrictions on personal freedoms are interspersed with instructions on altering pH and temperature regimes to get these reputedly sterile fish to spawn.

One final occasion, I take the bus out of another downtown conference centre and walk into Walmart. I have come to this store as it is open 24 hours, allowing a full day of academic sessions before a final attempt at this fragmentary ethnography of American GloFish™. Bearing in mind the hour and the neighbourhood, the branding over the door, hopefully proclaiming "Save money. Live better", feels rather hollow. I presume this is the promise of the neoliberal bioeconomy. Genetically-modified life, on hand, cut price, whenever you want to buy it. However, although the shop has shelves of ready-fitted aquaria, replete with required black light, glowing gravel and a small assemblage of plastic plants to show off your fish, the animals themselves are absent. You can no longer buy zebrafish at this store. Walmart have reduced the number of outlets selling fish. They say it is in response to dwindling sales, so perhaps it is their effort to save money. But there have also been active campaigns against their sale of live animals because of welfare concerns. The questioning of what it means to live better is not missing in this context, but its entanglement with questions of aesthetics and legal control is markedly different from that in Singapore or Europe.

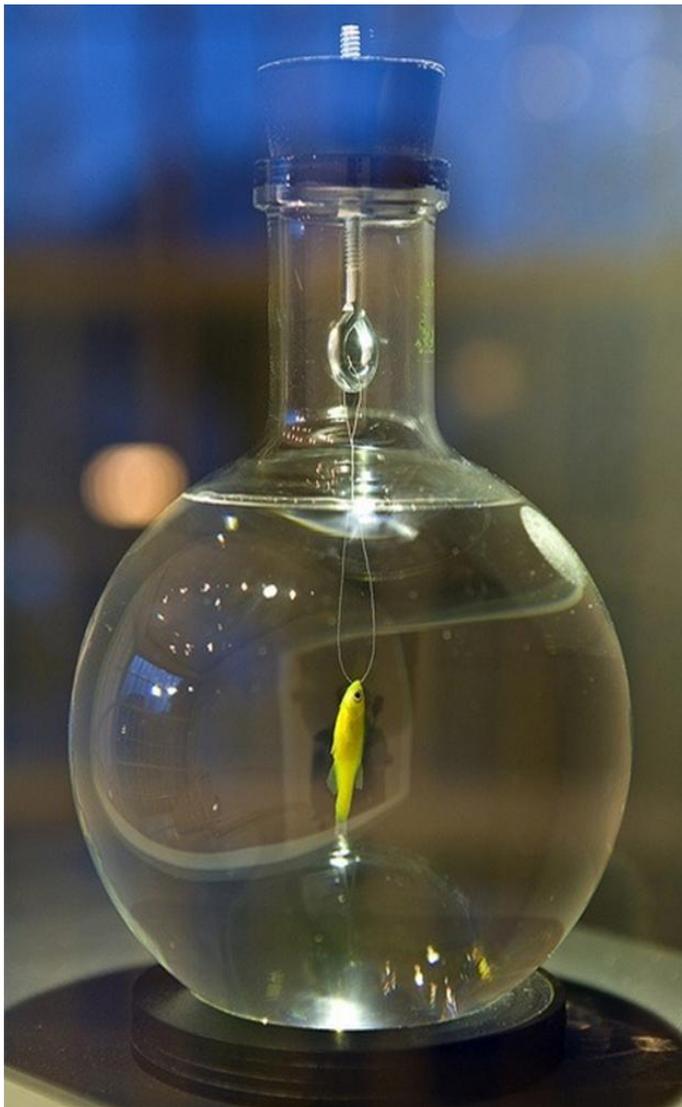
### **Gallery Z33, Hasselt, Belgium,**

In a modern art gallery, situated in the historic city of Hasselt in Belgium, I walk around the still quiet space in conversation with Rich Pell. There is a smell of freshly painted walls and a sense of anticipation for the opening the next day. The theme of exhibition is

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<sup>9</sup> For a selection see <http://www.youtube.com/watch?v=W1xbk7M1yIo>, [http://www.youtube.com/watch?v=\\_LR3Au6vVm0](http://www.youtube.com/watch?v=_LR3Au6vVm0), <http://www.youtube.com/watch?v=9LNaT8Qhzak>, <http://www.youtube.com/watch?v=t4HVdelHIX8>. There are many more similar sites showing footage of experimental tank assemblages and temporal transformations, many with comments and discussions underneath. Videos were last accessed May 2013. For comments on the ethical acceptability of zebrafish see for example, <http://freshaquarium.about.com/u/ua/newscontestsandpolls/glowowners.htm> (last accessed May 2013)

‘Alter Nature: we can’<sup>10</sup>. It features a range of European, American and Asian artists, all of whom are working through contemporary interventions with biological materials, offering refractions of the practices of biotechnology or transformations of older natural history traditions. Some displays are still being assembled and finalised. Those containing living biological materials have a fragility and shelf life that requires these last minute adjustments, but not the zebrafish. Packed in a vacuum flask, and suspended in alcohol, the fish hangs down in small natural history style display case, its luminescence still intact. A dead fish in art gallery is a rare example of an acceptable form of public display for genetically-modified zebrafish in Europe.



**Figure 4:**  
Transgenic zebra fish, specimen collection, Center for Postnatural History  
(Photo: Kristof Vrancken / Z33, reproduced under the creative commons license)

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<sup>10</sup> The exhibition ran 21.11.2010 to 13.03.2011, for more details see <http://www.z33.be/en/projects/alter-nature-we-can> (last accessed May 2013)

Here, the breeding, use and distribution of genetically-altered animals are controlled through licensing procedures for experimental animals and genetically-modified organisms. Currently, no genetically-modified fish are authorised for release or marketing in Europe. The prohibition on release defines the scope of these animals' identities and spatialities. Genetically-modified zebrafish can only legally live within licensed scientific laboratories and facilities. This then places them under the auspices of a further set of regulatory procedures for laboratory animal science in Europe, controlling their supply and breeding, the conditions for their husbandry and housing, and the qualifications of those responsible for their care and welfare. There are no legal aesthetic experiments with domestic tanks of genetically-altered zebrafish in Europe and no permitted exhibition of these animals in public aquaria either. Experiments and aesthetic experiences with the living luminescence of *Danio rerio* are restricted to the modest witnesses of science. This restriction accords with the views of one European scientist I spoke to, who linked ethics and aesthetics in the scientific use of these genetically-modified animals, suggesting that for public sale “making a glowing transgenic fish is slightly cruel and tacky”.

Rich Pell is initiator and director of the Center for Post Natural History (CPNH). The Center has a physical base in Pittsburgh, USA, which opened in 2012, but it has been working on practices developing an experimental archive of genetically-altered animals for a while. We walk around chatting about his work and the other exhibits. It is an easy and enjoyable conversation. We have interests in common and for once I don't have to explain why a geographer is interested in the spatial distribution of genetically-altered animals<sup>11</sup>. Earlier projects, under the auspices of the Center for Post Natural History, explore the institutional absences in documenting and archiving the contemporary re-organisation of life, as well as exploiting the empirical excesses which mapping the distribution of species can reveal. His previous work includes 'Permitted Habitats', charting the location of US field test permits for genetically-modified organisms from 1987 to 2008, which is animated online as an erupting field of life as novel forms of plants and property transform the earlier agricultural geographies of the USA. A later residency at the Smithsonian explores the historical geographies of those preserved rodents finding their way into this establishment, through practices linking specimen collection, military incursion and the sites of post-war atomic experimentation<sup>12</sup>. These shared interests are not only in the spatialities of genetically-modified life, but also in the

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<sup>11</sup> This conversation continued over into conference sessions at the annual meeting of the Association of American Geographers in New York in 2012. The sessions on “Practices for a post natural history” involved two papers sessions and hands on panel discussion involving specimens from the Center for Post Natural History <http://meridian.aag.org/callforpapers/program/SessionDetail.cfm?SessionID=14268> (last accessed May 2013). For more information about the CPNH see <http://www.postnatural.org/index.php> (last accessed May 2013)

<sup>12</sup> Links to the permitted habitats project are at [http://www.postnatural.org/permitted\\_habitats.html](http://www.postnatural.org/permitted_habitats.html) (last accessed May 2013) and more details on the work at the Smithsonian is at <http://postnatural.org/blog/?p=24> (last accessed May 2013)

generative qualities of collections, the redistribution of critical capacities in making sense of these emerging geographies, and the place of perplexity in ethics.

As we are talking a member of the gallery staff introduces a representative from the local press. Pell seamlessly switches into an explanation of the work of the CPNH as a form of public outreach; taking a position outside of position taking in order to prompt public discussion, reflection and, at times, frustration. As he says:

“As a strategy we make an attempt to describe the postnatural world without using the language of industry, academia or activism. In practice, this is not always possible, but it remains the ideal goal. Forming one's own opinion can be a frustrating experience. We are sometimes contacted by people, months after coming across one of our exhibits, who are still wrestling with an issue. For us, this is encouraging. The issues are too important and too complicated not to be questioning our own assumptions and re-framing our own ideas in new ways.”<sup>13</sup>

In the Hasselt exhibition, the complex spatialities of contemporary zebrafish are made visible to the public alongside the preserved specimen, through the mobile and multiple form of a natural history collecting card, which can be picked up by gallery visitors. On the front is an image of the orange sunburst GloFish<sup>TM</sup>; on the back: their place of production, species range, transgene modification and CPNH catalogue number. This process of making visible also identifies further absences. Yet again, the ethical significance of this final encounter with the animal is transformed by a confrontation with the practices of erasure. The narrative text on the card explains:

“In November 2006, the Netherlands Ministry of Housing, Spatial Planning and the Environment (VROM) discovered that a shipment of 1,400 GloFish<sup>TM</sup> from the US had been sold in aquarium shops. The fish were recalled and destroyed”.

There are fundamental spatial incommensurabilities in the circulation of genetically-modified zebrafish. Each encounter enacts a complex performance of ethics, presencing and absencing different forms of affective engagement with animals. The sensuous interplay of science, commerce and art fail to produce agreement about the proper conduct towards these new fluorescent companions; rather there is what Rancière might identify as ‘a tangle between several forms of indeterminacy’ (Rancière, 2009, p.114). These uncertain aesthetic and ethical judgements resolve to shape the different

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<sup>13</sup> The following extract is taken from a similar sentiment expressed during an interview here <http://www.we-make-money-not-art.com/archives/2011/04/richard-pell-director-of-the-c.php> (last accessed May 2013). See also this video, taken in the gallery in Hasselt shortly before the exhibition opening <http://www.youtube.com/watch?v=jpv8f1tD4TM> (last accessed May 2013).

experiences of life, and death, for zebrafish in the three locations. Perhaps, in this context, the most productive critical position is the deliberate performance of detachment, stepping outside of these contesting circuits of aesthetics, exchange and value, refusing to moderate scales of comparison and compossibility (see Serres 1989), leaving the centre unresolved. The final absence is transformed into an ethical space, *unrecognition* works as an interventionist stance (Dixon and Ruddick, forthcoming) in the challenging call to think creatively about the possibilities and impossibilities of new relations and new forms of life.

### **Geographies of the neon baroque**

A key question is opened up through these three ethnographic vignettes, which is repeated in each instance, but has no singular answer. What is the proper way of knowing and living with a genetically-altered zebrafish? To ask the question is to open up a conversation about the changing constitution of power, subjectivity, representation and reproduction in relation to these new forms of life. To try to answer it demands attention to a baroque patterning of scientific practices, aesthetic sensibilities, ethical responsibilities and legal spatialities. To identify this as baroque is not simply to give another name to its complexity, although that is part of the story; as is the aesthetic interplay of light and shade, and presence and absence, in the theatrical staging of each incomplete encounter. The transnational biogeographies of genetically-modified zebrafish are topologically complex and enacted through impossible imperatives. In pattern or process they do not have the linearity or coherence that recurrent metaphors of slippery slopes suggest in public discourses of biotechnology. Furthermore, even to propose this is a complex assemblage does little justice to the repeated moments of redaction, disappearance and non-relational abstraction in each of these narratives. The relations are labyrinthine and enfolded, but they are fundamentally lacking a centre.

It is possible to animate this central conceptual absence in several ways, drawing on the work of Foucault and Deleuze, conveying from their analysis echoes of an earlier baroque in historical conjunctures, characterised by caesura rather than certainty, which ripple through this contemporary geography of the neon baroque. The first is Foucault's analysis of Velasquez's *Las Meninas*, where he suggests 'there's a hole in the middle, a gap, which is the invisible absence of the capacity to represent representation' (Foucault, 1970). For Foucault, the courtly painting of *Las Meninas* represents a culture in tension, on the cusp between classical and modern periods and epistemes. This is a painting of a powerful setting, yet it is one in which central authority and representational codes are losing their 'invisible powers'.



**Figure 5: Diego Velázquez (1656 - 1657) Las Meninas**

The artist, looking out from the painting, demands we engage with the cross-cutting gazes of the complex cast of characters which populate the rest of the canvas. Try to chart their sightlines and the perspectives do not cohere; rather the 'slender line of reciprocal visibility embraces a whole complex network of uncertainties, exchanges, and feints'

(Foucault 1970). He continues: ‘all the lines of the painting, and above all those that come from the central reflection, point toward the very thing that is represented, but absent. ... Even so the absence is not a lacuna [...] for it never ceases to be inhabited’. The viewer is the most important dynamics that animates the image, but it is not held within the field of the painting. In a similar fashion, the patterns of presence and absence traced through the ethnography of glowing zebrafish suggest cultures in transition, a caesura in the coherence of power. The central authority of science in generating, defining and representing these new technological species is decentred as new uncertainties open up in the relations between scientific, commercial, regulatory and popular practices, reshaping life and the lives of these animals. It is the position and perspective of the viewers, distanced over space and patterned through time, that animate the meaning of the genetically modified zebrafish.

European scientists have sought to retain a sensibility to scientific representation, which allies truth and beauty in a determinedly non-baroque, even platonic, aesthetic relationship<sup>14</sup>. This may have mythological rather than pragmatic status in science, but it nevertheless inscribes a powerful linear association between form and function, simplicity and efficiency, the universal and each of its instances, promising potential by moving towards truth. It is not only an aesthetic criterion, but a promise of authority and control. In this formulation, to break the link between form and function, as in the trivial construction of glowing zebrafish pets, is not just in bad taste, it is also an affront to the ontological basis through which science seeks to reproduce itself in this context. European modes of care for genetically-modified organisms involves protecting the link between form and function, restricting the aesthetic sensations produced by these animals to their proper laboratory place, outside of which they are destroyed.

In the vocabulary of Rancière (2009), this is an aesthetic and ontological form of Plato’s community, in which there is a ‘police distribution of the sensible’. That is, for the scientific use of these animals, there is ‘the existence of a ‘harmonious’ relationship between occupation and an equipment; between the fact of being in a specific time and place, practising particular occupations there, and being equipped with the capacities for feeling, saying and doing appropriate to those activities’ (Rancière, 2009, page 42). What is an aesthetically acceptable distribution of sensibilities and capacities around genetically-modified animals within the laboratory becomes intolerable within the

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<sup>14</sup> Similar debates about art and science have recently re-emerged in discussion of the 2010 book on art and science by physicist Levy-Leblond (2010). In one review Mandelbrojt (2011) discusses how, in some formulations, “The beauty of a scientific statement or proof is linked to its simplicity, to its generality. Perhaps the true beauty of science lies, as it does in most human activities, in the equation between the instruments and their function. A beautiful formula, a beautiful experiment is one that is adapted to its purpose with the maximum of simplicity and efficiency.” I am grateful to Angela Last for bringing this reference to my attention.

domestic spaces of everyday life. There, for the European observer, it is baroque, in the sense of signifying decadence or decline (Hills, 2007).

The second resonance is with the crisis in property Deleuze identifies in the baroque, by way of his engagements with the vitalism and early modern philosophy of Leibniz. Here Deleuze suggests, 'if the baroque has often been associated with capitalism it is because the baroque is linked to a crisis in property, a crisis that appears at once with the growth of new machines in the social field and the discovery of living beings in the organism' (Deleuze, 1993, page 110; see also Munster, 2009 and Murray, 2008). In this formulation the baroque is an historical, empirical and conceptual phase concerned with growth and differentiation in living beings, scientific applications, commercial opportunities, and state power. The aesthetic and ethical provocation here is not backwards, as in the decline and perversions of the European Baroque, but outwards, in the exploration of new possibilities, demanding inventive ways of harnessing the energies emerging from the differential forces of life. The baroque sensibility evoked by Deleuze is not concerned with essence, as above, but in the endless production of folds and the infinite divisions of matter. What constitutes a body, what properties a body holds, and what is owned by whom, become critical in this context of mutation which reshuffle relations.

This openness to the aesthetic intensities of newly generated forms of life is more characteristic of the conversations over the personal experimentation and reproduction of pet animals in the United States, sustaining Dosse's suggestion that there is a 'common ground between the conceptual thesis [of Deleuze and Guattari] and the singularity of American civilisation' (Dosse, 2011, p.478). Here, in the US, the public interfaces of science are already more evidently multiple, unapologetically commercial and openly political than in European contexts. As genetic technologies flow liberally outside of laboratories, saturating the food supply, there is a multiplication of sites, images and commodity forms through which to engage the futures of the unfolding biotechnological. The alliance between genetically-modified form and function here is less about the continued coherence of European Enlightenment ideals of scientific truth and beauty, and more about the proliferation of future opportunities. The aesthetic is neither platonic nor policed; the link between occupation and capacity, scientific instrument and function is uncoupled to usher new possibilities and new forms of life. In this sense, the popular experiments with zebrafish can be construed as a form of emancipation, the redistribution of the aesthetic sensibilities from scientists to publics. There is the freedom to consume, to experiment and sometimes to care, even as it is being critiqued for being a kitsch commercial aesthetics, turning sensations into objects for consumption (Montgomery 1991). Here, as well, it is a context in which contestations about intellectual property rights and controls over the reproduction of animal life become key. Perhaps fittingly, this geography of the neon baroque turns out to have its own baroque geography.

Returning to Singapore and the conceptual flexibility and historical inheritances of the postcolonial baroque also have purchase (see for example Zamora and Kaup, 2010). The impulses of the colonial baroque remind us that the baroque was also the apparatus and expression of state authority, meeting the puritan challenge and revelling in power. As ever, this aesthetic imposition is not a simple one, but an attempt to retain classical ideas in a world “thrown off centre by cosmological and geographical discoveries” (de Ventos, 1991, p.116; cited in Blackburn, 1997, p20), which was open to reinterpretation by those it sought to subjugate. Now, at the margins of former colonial territories a new kind of centre for the contemporary baroque is emerging. This is not constituted through a fading European ideal or a singular notion of American civilisation. If historic analysis of the postcolonial baroque stressed the imposing and seductive capacities of these aesthetics, and the ways in which they subsequently allowed the baroque proliferation of identities, the constant interplay between subversion and complicity, power and powerlessness is more evident and immediate now.

Singapore is currently involved in the relentless remaking of networks, connections and regulation. Here, Foucault’s identification of the ‘complex network of uncertainties, exchanges, and feints’ at the centre of *Las Meninas* has become the model for a new mode of life under crisis capitalism, taking shape in the form of an experimental state (Waldby 2008). Outward looking, directed to managing the biopolitical implications of its vital trade networks, geographical links are forged and remade at the same time as aesthetic associations and ethical regulations are made and replaced. At the centre is a restless manoeuvring, as mobile as the circulating forms of fluorescing jellyfish in the tank at Underwater World. GloFish™ are pioneered here, their early exhibition triumphed, the animals withdrawn and their sale prohibited, at least until the required intellectual property expertise is in place and any risks to the valuable trade in tropical fish are assessed and ameliorated<sup>15</sup>.

The final question remains about the methodological value of the baroque for social science and for artists; as the editors ask in their opening comments, what can the baroque do as a form of interpretation, intervention or critique? Fittingly there is no singular answer here either. The baroque does offer attentiveness to an impossible complexity (Kwa, 2002), one that is now shared with some respondents working in genetics who increasingly identify the baroque architectures of genetics as a necessary corrective to earlier reductionist, or perhaps modernist, assumptions about genes (Avisé 2010), but it is not unique in that. It also offers the potential to probe the contemporary conjunctures linking the changing practices and patterns of authority in the life sciences,

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<sup>15</sup> See for example [http://www.gmac.gov.sg/News/2003/2003\\_12\\_10.html](http://www.gmac.gov.sg/News/2003/2003_12_10.html) last accessed May 2013

politics, property, publics and art. However, as indicated above, this is patterned over time and space, incoherent in its own terms and, in addition, this aesthetic term offers little solace to those who want to proffer bio-art as a privileged standpoint for contemporary critique. Instead it is the alertness to absence I have found of methodological value in the baroque and on which I want to conclude.

The invisibility of the empirical in each of these instances of ethnographic enquiry meant that conceptualization kept outrunning its case. The question in tracking the contemporary biotechnological is not only how to conceptualize the empirical, but also how to stage or conceptualize the empirical as an arena for conceptualization in the first place. There is no firm place to stand at the centre of this study of the international circulation of genetically modified zebrafish, as animals, ethical responsibilities and aesthetic sensibilities move in and out of focus. Even recognizing this instability does not make it fully visible, for the perspective of a knowing subject is evacuated in the same process, leaving a set of impressionistic narratives rather than the promise of a comparative ethnography. As suggested in the opening editorial, and as demonstrated in the work of Rich Pell, this *unrecognition* and the frustrations that come from evading or denying the possibility of closure might be productive, especially when faced with either entrenched discursive devices or the violent abstractions of life that result from authoritative impositions of clarity. At each site, the fluorescent impressions left by glowing proteins endure, and forming subject of ethical and aesthetic debate, even as, each time, the animals themselves disappear. There is the potential for the redistribution of academic sensibilities and critical capacities in this tale of aesthetic collaboration, ethnographic failure and academic narration, but there is also an important awareness to the place and proliferation of absence in research practices. If this paper cannot have a more unambiguous conclusion it is because the most important point is that which is no longer there, whilst the traces of neon light remain.

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