

The Future of Nature

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I write, not about what nature is, but what it might become.

I write not about nature present or nature past, but nature in transition to something new and not entirely 'natural'.

I write about retelling what humans are, as nature is transformed.

Jokes about Genes

"They've taken away sperm donors' anonymity. Hello, Dad." The caption to a *Spectator* cartoon tells part of the story. The illustration conveys the rest. For it is not just one child conceived by donor insemination that comes knocking at Dad's door, but thousands of them, receding into the distance. (*Spectator* 2002)

Stories of donor inseminees in search of the father may be read as the perfectly 'natural' quest to find one's genes, for example to gain knowledge of possible diseases that run in the family. If the donor is found, the story becomes one of finding something once thought perfectly natural, a biological family. There will be new family stories to add to the stories of the family of nurture. The story is about seeking one's true 'nature' in the language of nature itself, the language of the genes. (Overington 2002)

What is more natural, than one's genes? They say we share 99% of our DNA with the chimps, 95% with the fish. We are all members of the one genetic family called life on earth. We feel pity for the rocks that lack the gift of life.

The cartoon depicts a new kind of 'natural' family, one father with thousands of offspring all the same age, coming to make demands upon him. For the sperm donor, it's a horror story. For the children, it could well

be an economic opportunity.

Jokes about genes are inspired by the ambivalent nature of the public perceptions of what nature is becoming. On the one hand, a highly technologised 'nature' promises wonderful new medical cures, foods, and vaccines we can eat in bananas. Better than the real nature, which gives us plagues and droughts and bodily decline.

Critics are doubtful. They want their nature to be what it was, back before the ravages of industrial revolutions, back before human populations exploded at the expense of plants and animals. If nature is to be renovated, as one renovates a house, if nature is to be 'made over' as in Burke's Backyard, then by all means let's do it but in the best kind of way. Let's create a brand new world, one in which there will be new values and priorities, and nature will be 'better', but better in terms of the entire biosphere.

There's a catch though. Nobody knows how to do it.

Jokes about genes play with knowledge of human frailties. If things can go wrong, they will. One thing we can do is laugh about it, even if the laughter is hollow, and we wonder who will get to have the last laugh. Or, more hopefully, jokes about genes show a creative resilience in the face of the wholesale transformation of nature currently under construction.

As discovery after genetic discovery is reported in the media, public perceptions of the future of nature combine wonder at all that is new with suspicion about the consequences. Here genetically modified canola is released, there an *in vitro fertilisation* baby is created to be immunologically compatible with a seriously ill sibling. Here cloned cattle produce pharmaceuticals in their milk, while elsewhere genetically modified insects

are created to self-destruct.

Science, a body of knowledge relatively recently acquired, has invaded, occupied, and annexed a large area of the human imagination. A culture colonised by science is a culture both fascinated by the technical possibilities and fearful of them. As science increases in prestige and economic power, it is like other imperial powers that profess a moral justification to bring order and civilisation, this time in the form of health-care and food to developing countries. Meanwhile, agribusiness and the pharmaceutical industries, bio-piracy and bioterrorism follow their own economic, political and ideological agendas.

Nature is going where it hasn't gone before. One question has to be 'what is going where?' Another set of questions immediately follows: Who is taking nature where? What are they doing it for? Who will benefit? Who will lose? What, in nature as we currently understand it, will be lost? Forget human forms of life. They've only been around for a few million years. They won't last forever. But the nature that will continue when we are gone, what are we creating it to look like? And will it matter what we do, a few million years down the track? A natural event may occur, another asteroid impact, which will propel what life is left down quite unanticipated pathways.

Meanwhile the drama of human life unfolds within the larger drama that is nature. In the cartoon, the sperm donor's children are taking control. A natural infertility has been bypassed through human intervention. But there will be unintended consequences, some of them perfectly natural. Like other colonising forces, science encounters the resilience of those who, in both respecting and resenting it, may choose to use aspects of the colonising culture to generate transformation. (Ashcroft 1999). In the cartoon, the sperm donor's children are taking control. The postcolonial transforms the nature of the power that has hitherto dominated. In real life, the children, in finding the long-lost father, reshape a story about their place in nature, enriching it with a story of family and cultural identity. They do not say they are after his money. That would be unnatural.

Alba, the Bioluminescent Bunny

The creator of Alba the fluorescent rabbit is a US-based performance artist, Eduardo Kac, who worked with French scientists at the French National Institute for Agronomic Research to create in living form a piece of transgenic art. Kac and his scientist colleagues created a fluorescent rabbit called Alba, an albino rabbit treated as an embryo with the addition of a EGFP, an enhanced version of the green fluorescent gene found in a jellyfish. Alba, the rabbit/jellyfish, glows gently in the ultra-violet dark.

In Alba, science meets performance art. First, Kac engineered the creation of the rabbit. Second, Kac intended to rear her as a domestic pet, to make the rabbit part of his family. Third, Kac created a transgenic life form to provoke public debate. He chose a rabbit rather than a fish because, 'it's hard to integrate socially with a fish'. He would have preferred a dog.

As one reviewer in *NY Arts Magazine* wittily quipped: "One small hop for Alba, one large hop for mankind." (Allmendiger 2001)

At first glance, this project appears a trivial and potentially dangerous use of science. Kac certainly succeeded in his project to arouse public debate. He was roundly criticised by everyone, from scientists and animal rights activists to ethicists. Steward Newman from the US Council for Responsible Genetics gravely announced: "I don't think we should be manipulating complex organisms in the name of art." (Lynch 2001)

Kac replied that denying artists access to biotechnology is an unsustainable position (as unsustainable, as would be, though Kac didn't say this, as denying access of bioterrorists to biotechnology). Kac argues that it's the role of the artist, as an agent of cultural transformation, to point to the paradoxes.

The second part of his plan was foiled. When the new head of the French Institute found out about Alba, he refused to let Kac take her home. The proper place for a research animal, he said, is the research laboratory.

Except, as Kac was swift to reply, there are already plenty of transgenic sheep, pigs and cat-

tle outside research laboratories and in daily contact with people. If they are safe, then so is Alba. If scientists can claim the right to create transgenic organisms for human benefit, then so can artists.

Kac offered to get Alba spayed. Still they didn't release Alba to him.

Danger, Kac argues, is not the real issue. Alba, he says, is really our transgenic Other. (Lynch 2001) We're both frightened of her, and excited by her. He's started a 'Free Alba' movement to spring Alba from imprisonment. He's engaging with, he says, intervening directly in a meta-narrative of science, that transgenic animals are only safe and only ethical in a situation where their creation is tied to a scientific notion of human benefit. In asking "what's wrong with Alba?" he may perhaps err on the side of optimism: he believes that Alba is happy and she does not suffer.

Biotech artists, Kac says, are the hackers of the future.

And here lies another question. If I feel edgy about having the future of nature controlled by scientists, do I sense in myself an increased edginess about having it under the control of a performance artist?

The Ambiguity of Complexity

Nature is a set of complex systems of many different parts that interact in many different ways. Natural systems display spontaneous self-organisation. They generate emergent properties. The future of nature is one of unforeseeable outcomes. Complex systems exist in social, economic, political and cultural life. (Taylor 2001) Peter Wills is concerned about the long-term large-scale changes that emerge as complex biological systems evolve, as small-scale local perturbations interact and compound. (Wills 2001) The Burke's Backyard approach to renovating nature poses huge problems if the backyard extends outward to the biosphere. What if a small-scale local change, the bioluminescent bunny in Eduardo Kac backyard, gets to interact with other small-scale local changes? What if Alba escapes by tunnelling underneath the back fence? Alba, by

herself, according to her creator, is just a rabbit, albeit one that glows under fluorescent light. That's one man's opinion. What will happen next, as Alba the escapee interacts with complex systems of which she is but one small part? She may be infertile. But when she escapes into the Australian bush, she may encounter myxomatosis, or the calicivirus. Alba may die from the encounter, but the viruses may live on, glowing gently in the ultraviolet dark.

Complex systems have two major characteristic and ambiguous features. One side is potentially creative, and allows for greater speed and efficiency; the other side is potentially destructive and may generate catastrophe. All systems, whether biological, social, political, economic or cultural are susceptible to natural, human and organisational error. (Pauchant and Mitroff 2001)

Critics of the trend to change nature for the better point to the possibility of disaster. Pollen drift may transfer foreign DNA from genetically modified crops to weeds. There may be increasing chemical pollution from fertilisers for genetically modified crops. Bio-incidents could arise from the release of unforeseen hazardous products, and disasters such as the accidental or deliberate elimination of a country's main export or domestic crop. The polio virus is bio-engineered in a germ-warfare laboratory just as polio is eradicated through vaccination. (Wheelis 2000; Wimmer 2002)

There could be a plague of disease-resistant bioluminescent rabbits across the countryside.

Thierry Pauchant and Ian Mitroff are the authors of "The Ambiguity of Complexity: neutralizing the Joker in a world without Batman." Though the article was written in response to the World Trade Centre attack of September 11, 2001, its ideas are relevant for thoughts on the future of nature under human domination.

The first strategy in coping with the destructive side of complexity is to "Search deliberately for the destructive side of complexity." In thinking about what nature has been, what it has become, and what it will be, the search must include thinking long and hard about the dangers. Critics who want something

more for the future of nature than is currently offered are central to the project. They're not just a mob of Luddites rehashing the same old 'back to the trees' diatribes.

The second strategy is to "increase safety in the fundamental design of products." Imagine if new products were designed with safety as the primary objective. Pauchant and Mitroff say that 76% of the criteria used to measure efficiency are financial, while only 24% promote non-financial indicators such as health, safety, or environmental and social impact. From this they take one lesson from the relatively better survival of the Pentagon under terrorist attack: pay more attention to safety. The Australian economist Hugh Stretton asks: "Suppose it turns out to be true that in the course of the twentieth century the rich countries crossed a threshold - a level of income per head above which more is not likely to increase health or happiness?" He then asks: "What to do with more than enough?" (Stretton, 1999) One thing to do with "more than enough" is to put safety first. Anne Kapuscinski from the University of Minnesota wants bio-safety protected by much stronger controls, supervised by independent safety advocates. She wants safety built into the system from the start. (Pew Initiative Symposium 2001) Nature isn't safe, that we know already. Unleashing new natural forces is something to avoid.

The third strategy is "to decrease the coupling between the different elements of systems." The example Pauchant and Mitroff cite is the eradication of small-pox by separating the disease vector from the vulnerable animal population. Public health measures at present have been victorious in keeping them separate. The unspoken implication is that they are only separate until a bioterrorist act sets small-pox loose again, making use of the coupling between the different elements of systems, including airline systems.

The fourth strategy is to promote a more equitable distribution of wealth. The virtue of complexity theory is that it acknowledges the interrelationships of all complex systems in nature and society. Food crops matter to the countries that produce them. They matter as

few other things do, to the poorest of the poor. Retelling the stories we tell of ourselves means including making their stories matter, equally, if not more, than stories agribusiness executives tell of their solutions to famine and poverty. Retelling what we are in this future nature means more inclusive stories, stories in which more is taken into account than mere economic advantage.

Learning to think about nature in terms of its complexity needs more than the call to local or world government regulation. Regulations govern some activities in some places, but will never cover every eventuality, every mad scientist, everything rogue dictator. Even in regulated countries, so much is happening that is moving in advance of regulation, in reproductive technologies such as cloning, for example.

The final strategy is to "promote active learning from precious crises." For Eduardo Kac, Alba may simply be a potential family pet, but for Australians, the rabbit is the epitome of havoc created by the whim of European settlers who acted in total ignorance of the consequences. The Pew Initiative on Food and Biotechnology at the University of Minnesota in a May 2001 symposium addressed the topic of the new range of agricultural biotechnology products under proposal. Anne Kapuscinski spoke on learning from past crises, and noted that even the nuclear industry in the USA is seeking a more participatory process in the light of its past mistakes. She calls for a post-market monitoring system for genetically modified organisms released to the environment.

The time for a moratorium on genetic manipulation is past. New Zealand may be able to elect to go "GM free", but it will be one of the few isolated places for which the possibility is still open. The era of genomics has arrived, just as the era of nuclear power was ushered in, by fiat. Bill Ashcroft says that "The central strategy in transformations of colonial culture is the seizing of self-representation." (Ashcroft 2001) The time has come for the seizing of self-representation in biotechnology.

Large biotechnology businesses have grown on the basis of research once conducted in public institutions for public benefit. To what

extent the outcomes will be fair to all, and how they might contribute to a better earth is unknown. What to do, with more than enough?

I'd like to add an additional strategy, learning to see nature anew, in terms of its future.

Seeing Nature Anew

What is more natural, than a baby? What is more strange, than the *in vitro* human embryo, available for all to see as its image is magnified and shown on the TV news? The cells divide before our eyes. The thought comes to mind, "Once I looked like this. But nobody saw me. I had a secret, invisible life, back when it was possible to be left to one's own devices as a fertilised egg."

Soon, with the new science of bioinformatics, it will be possible to 'see' at the cellular level, adding a new dimension to current ways of seeing life through the imaging techniques of ultrasound and MRI. In the past decade the "omics era has come to prominence: new sciences of genomics, proteomics, metabolomics, cellomics, and organomics, coupled with bioinformatics. Genomics researchers David Ward and David C White announce: we are going 'where no one has gone before' with ever smaller, ever faster ever more automated, ever more comprehensive, and somewhere in the future, more affordable analyses of the most critical cellular processes." (Ward 2002)

At the other end of the spectrum of the visible, weather images show daily the big picture as seen from the satellites above. Devices to 'see' nature, or deviations from the natural, will soon be available in everyday life. Household devices will measure and monitor water and air pollution, rendering visible what was formerly invisible. Soon we will come to think of such devices as perfectly natural household fittings. We won't be able to imagine how we did without them.

New ways of seeing nature have come about through human ingenuity in creating machines that probe into regions that were previously invisible. Nature has a design, though it has not yet been of our making. To nineteenth century naturalists, Nature's design was evi-

dence of the wisdom of God in the works of the creation. The task of the naturalist was to tell increasingly complex stories about the links between the creator and the created world. A century later, advances in genetics brought something entirely new to the relation between creator and created, the possibility of a partnership. The US theologian Ronald Cole-Turner believes that "genetics is part of the divine intention to make use of all that lies within human abilities to move beyond human nature as it presently exists." (Cole-Turner 2001) The future of nature is one where humans take what is given and add new dimensions to the evolving creation story. The implication is that this new partnership will bring yet greater glories.

The Czech immunologist and poet Miroslav Holub sees nature anew through genetics, but his is a secular take:

I couldn't say whether I am religious. I would obviously be as a unit, as a poor unit which is just an epiphenomenon of something bigger. This something bigger I would describe as a genome and not as a spirit. But anyway, it's something supra-individual: the genetic process of the planet. We are obviously in the position of religious individuals because it is way above our heads and we are not the aim of the process. (Holub 1992)

Holub saw the genetic process of the planet as something with which he could co-operate as a scientist, but not as anywhere near an equal partner. The spirit of humility towards the whole kept him in his natural place.

The futurist Bruce Sterling has a brasher approach to his capacity to intervene in the future of nature:

The Greenhouse Effect is a design problem. So it's obvious that's what's needed is a major new design movement. Something huge, ambitious, impassioned and impressive. And glamorous . . . a smarter and better movement that learned from earlier ones and makes different mistakes. A native, 21st century sensibility ... Creative of a new order, not subversive of an old order. Making a new cultural narrative, not calling the old narrative into question. (Sterling 1999)

Sterling's designer "call to arms" may work well in cutting greenhouse emissions through introducing alternative technologies and designing machines for cleaner living in a Greenhouse age. It may be that some of these machines will be intelligent and evolve in ways that may depart from the original intention of their designers. That is another story.

In creating forms of life that will produce food, vaccines and babies, humans are creating living machines that will populate the landscapes of the future. It's more than a question of designing life, difficult enough as that is, but also about designing life as it, in turn, evolves and changes according to rules not totally understood. And it's not a question of going back to the old days, not now. Calling for a moratorium on genetic manipulation is not a productive design approach, as Bruce Sterling would say, because the future of humanly designed life is a future that is in the process of happening.

That is why I write, not about what nature is, but what it may become. Nature is in transition to something new and not entirely 'natural'. I write about retelling what humans are, as nature is transformed.

I am a member of a future generation.

It is now possible to attend to the needs of those who do not have enough. It is possible to attend to the needs of the natural systems of which humans are but a small part, the animals and plants that are part of the evolutionary past and a present component of planetary biodiversity.

I am an individual with a sense of an ecological self. My freedom is not mine alone. I am a member of a human species that shares the planet with many millions of other species. I am mindful of my place in their web of life.

I am an individual who is a member of a family, a community, a profession, a culture, a society, an ecology. I am a global citizen, and perhaps an interplanetary settler.

I am a member of a species engaged in experimentation upon the conditions of its life. I am immersed in both social obligations and ecological duties.

I am a member of a future generation, and

I may well be grateful. Or I may ask, of all those who went before me, and who laboured for this end, "Why did you allow this to happen to me?"

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