Evolution, Mutation and Hybridity in Bio-Performance Practice: Wet Biology and Hybrid Arts in the Performance/ Installation *BioHome—The Chromosome Knitting Project*[1]

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Introduction

In this paper I explore the influence of 'Wet Biology' and Hybrid Arts practices on the development of my installation-based performance work *BioHome: The Chromosome Knitting Project.* This work has been developed as part of my recentl;y completed Doctorate of Creative Arts (D.C.A.) at the University of Wollongong.[2]

'Wet Biology' is the term currently used for working with live plants or cells in experimental contexts. It includes genetic modification of organisms and cell culturing. Hybrid Arts, as I define them, involve the incorporation of new technologies into the traditional creative art forms, as well as hybridising/ cross-fertilisation of art forms through creative partnerships with industry, science and other knowledge bases, such as critical theory.

At the moment there is a rapid hybridisation and evolution taking place in digital technologies and biotechnologies. For example digital forms allow communication and cross-fertilisation between radio and web-based formats, computers, radio and mobile phones, while biotech and Life Science industries are developing biological modifications and hybrids to respond to commercial markets. Artists who cross fertilise with these technologies can create hybrids and mutations of traditional forms. To use a Darwinian metaphor, some of these digital, creative and biological products may become strong enough to survive and possibly form new varieties, or where successful, new species of program formats and performance forms.

This paper documents my experience working with contemporary Wet Biology techniques including D.N.A. extraction, cell culturing and genetic modification of organisms during the research and development stages of the performance and how the influence of the scientific practices and notions of hybridity, evolution and mutation have influenced the form, content and processes of my work.

The key topics I investigate for the purposes of this paper include, first, that the message does respond to the medium: new biotechnologies can inform creative processes; and, second, that the biological metaphors of evolution, hybridity and mutation are relevant to the development of hybrid performance works.

Background to *BioHome*

During my D.C.A. candidature I developed three hybrid performance texts from original bio-ethical fables.[3] These fables explore the moral and bio-ethical issues associated with the complex 'Post-Natures' that we find ourselves living in this century, and the futures they suggest. I define 'Post-Nature' as a human or natural environment that incorporates the Life Sciences: recombinant genetic technologies and biotechnologies, which mould and create futures that radically alter our patterns of reproduction, food production and health management.

These fables have themselves 'evolved', 'mutated' and 'hybridised' to form the basis of a number of hybrid scripted works. Some of the hybrid forms in my work include cross-fertilisation between Wet Biology, performance, text, installation art, sound and video and some more traditional forms including puppetry, theatre and radio. I have used biological concepts and metaphors to chronicle my creative processes for these works. As I developed the hybrid works from the fables—exploring the themes of human and natural environments that are being transformed by biotechnologies—it was clear that these biological concepts and metaphors could also be applied to the creative forms with which I was working with as they evolved, hybridised, and were impacted by new technologies and biotechnologies.

In her essay 2006 "Exchanging Information: metaphors of computation in neuroscience, genetics and new media art", artist and theorist Michelle Barker suggests that metaphors of evolutionary biology were used and applied to many developing technologies in the New Media field, including robotics, a-life, cybernetics and computing. She notes that the original framing of D.N.A. as a 'code' has influenced this exchange.

By surveying other artists in new media fields, she explores how this exchange of digital and genetic languages, from 'code' and 'information' metaphors to 'hybrid, evolutionary and cloning' metaphors, have shaped the language and development of both the biological and the new media fields. She states: "I . . . suggest that importing the metaphors and framework of late twentieth century biology brought a certain epistemological politics to those artists' work" (Barker 2006, 95).

Barker also points out that the metaphorical basis for this language can be flawed, as the metaphors do not always represent the methodologies or practices being engaged with. I am aware that such metaphors can become essentialist in their use; these evolutionary and biological metaphors, however, have continued to influence my own work, and have been a useful framework for developing both content and form at various stages of development.

Based on my fable "The Woman who Knitted Herself a Child", the *BioHome* performance/installation examined the hybrid connections between the age-old technology of knitting and the base codes of D.N.A., using both as metaphors for the creation of life. The knitting/D.N.A. metaphor 'literally' became the subject matter for the fable "The Woman Who Knitted". In keeping with the biological metaphors, the subject matter of the fable, that of a biological metamorphosis through knitting a hybrid child, also resulted in the greatest creative mutation and evolution. The adaptation of the fable through three media—print, radio and performance—allowed me to experience first hand the hybridisation of both narrative and content, as I engaged in each creative processes.

BioHome

The hybrid piece which is the subject of this paper, *BioHome: The Chromosome Knitting Project,* represents the most 'extreme mutation' in form from the original fables. The final performance of *BioHome* took place in an installation depicting a 'Biotech Display Home'. By giving audience members

the opportunity to encounter live Wet Biology presentations, I hoped to challenge audience members to investigate and interrogate their understanding of new biotechnologies and their impacts on reproductive and environmental futures and kinship structures. Initially the audience entered the gallery and saw several domestic spaces. The overall imagery was domestic: a kitchen tabletop, a bassinette, a chair with knitting, and a bed with a screen. It was only after the audience entered and inspected more closely that this domesticity was disrupted by the intriguing and uncomfortable presence of Wet Biology products and procedures. Wet Biology on display included plant D.N.A. extractions, live insect cell cultures and salmon D.N.A. fibres, used for knitting. The blurring of lines between the home space and laboratory further intensified during the performance.

As well as biotech science, the interactive installation introduced the audience to laboratory safety procedures and biohazards, inviting them to undertake safety training and wear 'PC2' lab safety clothing before entering the household space. They were exposed to demonstrations and information about maintenance and disposal of these living biotech products.

Exploring Wet Biology practices in research, rehearsal and performance

The 'extreme mutation' of form in my hybrid performance emerged when I undertook hands-on Wet Biology practice during the research and creative development phase of my *BioHome* installation. As I started to explore both the ethical and practical impacts of the life sciences and biotechnologies that I was researching, there was a growing imperative to engage with the science at a hands-on level. This was in part encouraged by my attendance of the Experimental Art Foundation's Biotech and Art Symposium, held as part of the Adelaide Festival of Arts in 2004. As a result I was introduced to the work of Oron Catts and Ionat Zurr, co-founders of the Tissue Culture and Art project (T.C.A.), who are also directors of SymbioticA, the Science and Art Laboratory, which is incorporated within the department of Anatomy and Human Biology at the University of Western Australia, Perth.[4] My continued exploration of this subject led me to attend the SymbioticA Wet Biology workshop at B.E.A.P. 2004, where I was able to experience hands-on biotechnology practice; extracting D.N.A. from pea seedlings, creating a genetically modified 'glow in the dark' bacteria, culturing live cells from a pig's hock, and dealing with the issues of contamination, mutagens, and responsibility towards partially living objects first hand: how do we keep them alive? When do we let them die?

SymbioticA is a unique space both in Australia and internationally, where artists are encouraged to do hands on exploration of biological technologies and issues stemming from their use. Through the arts, SymbioticA seeks to take science beyond the laboratory and help the public develop a critical awareness of science and new biological technologies. The workshop introduced me to issues, concepts and techniques relating to the manipulation of life. Emphasis was placed on developing critical thought, ethical issues and cross-disciplinary experimentation in art. The tools of modern biology were demonstrated, but in turn this opened discussion about the broader philosophical and ethical implications into the extent of human intervention with other living things.

During this workshop, I was at the 'coal-face' of the science we are debating at a public level, and it was both exciting, an ethical mine field, and confronting at a deep level, the very reasons I had started to explore these issues in the first place. Most exciting was the discovery that I could in fact knit D.N.A. in its dried form.

As a result I realised the importance of 'presenting' this science live, rather than merely 'representing' it through a mediated form. I was inspired to take the representational aspects of the science further by presenting Wet Biologies within performance, allowing the audience to interact with the science that the work is critiquing, so that ethical questions could arise from the variety of meanings that were

created. Previously these technologies had been mainly used by visual and installation artists, but rarely presented in a performance context. It became apparent to me that there was a strong context for the production of this hybrid performance work. In this way the medium of Wet Biology itself did inform the creative process.

Presentation, not representation

Melentie Palinovski suggested in his introduction to the Biotech Art Symposium that in order for artists today to develop relevant Bio-art projects, they must provide:

- A clear context
- Compilation of data (bio, genetic, electronic or other); and
- An established relationship between the artists and biologists/geneticists.

(Palinovski 2004, 1).

Oron Catts and Ionat Zurrfrom the T.C.A. project go further in their 2005 article "Big Pigs, Small Wings":

> [a]rtists must immerse themselves in the dialectics of new knowledge and technologies. They must adopt not just a representational approach but what we refer to as 'wet engagement'. Hence, artists researching and exploring the role of biotechnology in society can and should engage with the actual technologies and get their hands wet and dirty (Catts and Zurr 2005, 22).

They suggest that artists such as Patricia Piccinini, who create works dealing with biotech by creating 'fantastical futures', need to engage with the real science that they are critiquing.[5] At SymbioticA, workshop conveners Oron Catts and Gary Cass also encouraged me to explore the live science to see how vulnerable, rather than monstrous, these 'semi-living creatures' were in reality. This imperative suggested an important direction in my project, which I followed. I diverged from the original fantasy suggestions in some of the fables, instead exploring the real sciences that they were discussing. For instance, "The Woman Who Knitted Herself a Child" dealt with genetic modification of bacteria, which I practiced in the SymbioticA workshop. I found that by doing hands-on science practice in laboratories—culturing cells and extracting D.N.A.—many ethical issues became apparent (see Fargher 2005). These ethical 'lines' needed to be negotiated, one experiment at a time. As Bio-artist George Gessert asked:

> [d]o artists cross the line when they breed plants and animals, or use the tools of biotechnology? Scientists regularly cross the line, so do farmers, military men, business people and doctors. Only artists and various religious people hesitate. To the extent that art favours awareness, the more artists that cross the line the better (Gessert 2003, 47).

In response to my first framing topic for this paper: that new technologies can inform the creative process, I would assert that as artists seek to engage with current scientific practices that effect the technological and social environment, they are well placed to create new modes of practice. Scientific disciplines and technologies offer both new modes of practice and also fertile ground for making important and relevant art works.

U.S. based artists collective Critical Art Ensemble, who engage with Wet Biology in some of their interventionist media strategies, suggest that the perception that science is too difficult for anyone other than a specialist to understand is socially ingrained in those separated from one discipline on an everyday life basis. They assert in their publication *The Molecular Invasion* that: "within a brief period of time, anyone who is moderately literate can earn the fundamentals of scientific study and ethics" (Critical

Art Ensemble 2004, 4). This was true of my experience of developing a scientific practice during the development of *BioHome*. The practice of science became clearer to me, and informed some of my narrative, performance and production choices.

Presentation of live 'Wet Biology'

At the development stage of the work, the decision to use live cells involved finding laboratories to collaborate with. I worked with the University of Wollongong School of Biological Sciences and the University of Sydney School of Agricultural Science, as well as having continued contact with SymbioticA The plant based bio-technology aspect of the development involved working with a molecular biologist, Dr Ren Zhang, from the University of Wollongong School of Biological Sciences, and Ph.D. candidate Bhat. These biologists assisted me in experimenting with the extraction of large quantities of D.N.A, from a range of plant materials, including corn, potatoes and wheat germ, with an aim to dry, spin and physically knit that D.N.A..[6] When my own attempts to dry large quantities of plant D.N.A. failed to produce a 'knittable' product, I developed methods to 'knit' live D.N.A. using a commercial product, Salmon Testes D.N.A., from a commercial sponsor, Sigma Aldrich Life Science Corporation.

The use of live caterpillar pupae cells in performance to depict reproducing life forms involved initial consultation with SymbioticA director, Oron Catts and Associate Professor Mark Wilson, at the University of Wollongong School of Biological Sciences. They instructed me in methods of culturing live cells, including feeding, maintenance and disposal. This process of immersion in laboratories gave a lot to the research. I discovered that scientists often work in small teams and that it is a highly collaborative area, not unlike theatre/arts. In the lab I learned to feed cells and culture them, as well as how to correctly use an inverted microscopes. I enjoyed the sounds of background radio and the sense of scientists coming and going as they maintained their experiments and waited for results. I heard stories of 'waiting' for cells to divide and the pastimes that scientists need to find as they wait: solitaire on the computer, or a drink at the pub. I incorporated some of this material into my fable "The Woman Who Knitted" and the *BioHome* script. Thus the hybridisation of texts occurred between generations of creative product.

Interestingly, while working with scientists during the course of my D.C.A., I observed that some forms of scientific collaboration are very similar to those that I have observed in the theatre arts over 20 years of practice. Scientists, for instance, often work in small teams and usually in pairs, they develop ideas collaboratively and only some parts of their practice are done in isolation (such as collecting and evaluating data etc.) These mirror much of my own work in theatre and performance, combining group and solo elements of creative engagement.

Hybridity and hybrid art collaborations

Charles Darwin explored mutation and hybridity in his 1859 work *The Origin of Species*. He saw that a successful mutation or monstrous adaptation might become selected by a species as a strategy for survival, leading to new variations, and potentially new species, and those daily transformations are part of evolution and reproduction.

> It may be said that natural selection is daily and hourly scrutinizing, throughout the world, every variation, even the slightest; . . . silently and insensibly working, whenever and wherever the opportunity offers, at the improvement of each organic being in relation to the organic and inorganic conditions of life (Darwin 1985, 133).

In other words, transformation and mutation are contained within the very nature of generating life.

The same is true within the creative process; a simple idea has the potential to mutate into many forms. Similarly, Elizabeth Grosz asserts in her recent work *The Nick of Time: Politics, Evolution and the Untimely*, that Darwin's work has radicalised our understanding of the nature of biology, life and nature itself. According to Grosz, Darwin has proved that life

> can never remain stable . . . must undergo change . . . to invent new methods, regions, tactics, and goals to differ from itself . . .The natural world prefigures, contains, and opens up social and cultural existences to endless becoming; in turn, cultural transformation provides further impetus for biological becoming (Grosz 2005, 1 & 9).

I observe that variations and hybridisation of forms are resulting for artists as they experience the 'New Natures' and technologies with which we find ourselves living.

Engaging with the scientific practice and its documentation in *BioHome* gave rise to the creation of a range of forms, including sound and video footage, experimental data, lists, descriptions and scientific procedures, web sites, promotional and corporate 'branding' styles, image based and object based work, and the idea of presenting the performance in an installation based space with the science presented 'live'. I also worked with interactivity and audience participation to enable the audience to take part in basic Wet Biology experiments. As a result *BioHome* has also been developed to exist in a range of contexts, i.e. scientific laboratories or conferences, galleries and museums, as well as theatrical and performance contexts.[8]

BioHome also had a number of collaborative hybrid elements, most significantly with Terumi Narushima, a Doctoral Candidate in composition from the Music department in the University of Wollongong's Faculty of Creative Arts. As a result of our collaboration, Terumi worked with me to create a soundscape for the performance. Terumi developed an interactive pure data software patch— used to translate data into sound composition—based on gel electrophoresis of D.N.A. sequences, taken from the SymbioticA workshop, held in Wollongong in 2005. She hybridised this with knitting patterns and knitting concepts, such as tension, yarn density, needle size, which I provided. She also performed a live sound mix for the performance, and created an interactive soundscape for the installation.

As a form of artistic practice, this range of research and documentation, as well as artifact creation and performance material has given rise to infinite variety and mutation. It would seem that the biological metaphor of hybridisation is relevant both for my practice and reflected in the content of *BioHome*.

I believe that as artists seek to engage with current scientific practices that effect the technological and social environment, we can respond to C. P. Snow's assertion in his landmark essay "The Two Cultures": that "[t]he clashing point of . . . two disciplines . . . ought to produce creative chances" (1964, 16). As Grosz suggests, artists and their creative forms, like any part of nature, are highly adaptable.

Notes

1. See www.biohomeproject.net

2. A performance of the work took place at the University of Wollongong faculty of Creative Arts Gallery in August 2006. Documentation is accessible at www.biohomeproject.net , and in the University of Sydney online jounrnal Philament: :http://www.arts.usyd.edu.au/publications/philament/index.htm.

3. The Original Bioethical Fables are "The Man With No Ear", "Corn Baby", "The Boy With No Belly Button" and "The Woman Who Knitted Herself A Child". A radio script of this last piece, titled *The Woman Who Knitted Herself a Child: radio play* was broadcast on A.B.C. Radio National on December 19th, 2004. A puppetry/new media script, *Dr Egg and the Man with No Ear*, was performed at the Sydney Opera House Studio in July 2007.

4. See http://www.symbiotica.uwa.edu.au/

5. Patricia Piccinini's works include *Still Life with Stem Cells*, *Siren Mole #1* and *#2*; and *The Young Family*. See http://www.patriciapiccinnini.com

6. My thanks are due to SymbioticA (Uni of Western Australia) biology trainer, Gary Cass, who assisted in accessing products.

7. I successfully sought sponsorship for D.N.A. and cell products from Invitrogen (sf9 cells) and Sigma Aldrich South Pacific (Salmon testes D.N.A.) ,as well as Eppendorf South Pacific (centrifuges and instruments).

8. Excerpts of the final work has been performed at conferences such as the Australian Computer Music Conference, and Australian Association for Drama Theatre and Performance Studies annual conference, and at festivals such as Playwork's 'Invisible Boxes' event. Film footage has been displayed at the C.S.I.R.O.'s cinema program for National Science Week, and will be performed at the Experimental Art Foundation, Adelaide's Art and Biotech event in October 2008.

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Catherine Fargher is a performer, writer and teacher working in radio, contemporary performance, new media and theatre. Her bioethical fable *Dr Egg and The Man with No Ear* was adapted for new a media/puppetry production at the Opera House in July 2007 and will tour to Chicago and New York in 2008/9. Her performance/Installation *BioHome* will be performed at the Experimental Art Foundation (South Australia)) Art and Biotechnology Event in October 2008. She is currently teaching at the University of Wollongong School of Creative arts in playwriting and radio production.