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Feminist Transgressions? Object and Process in Transgenic/Genetic Works by Women

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1. BIOLOGICAL AND GENETIC ART

Interest in new technologies has fostered a growing interdisciplinary exploration between artists, scientists, social scientists, and designers. Particular types of artwork have held attraction for the artist-scientist in the 20th and 21st centuries: artificial life, evolutionary art, and genetic art have been created by those with an interest in science and organic structures. Concerns inherent to these contemporary interests are centuries old;[1] the use of novel technologies to mimic or create life can be traced to the Ancient Greeks, Jewish, Chinese, and Egyptian cultures, in which stories of famous pneumatic automata and golem originated.[2]

Artists and scientists can now transform and create biological life. The ability to merge, alter, and create genetic code, the basis of all the life forms we know, changes the vocabulary, the attitudes, and the possibilities within all contemporary discourses.[3] Such discoveries shift artists' relationship to technology and bodies, pushing what once were two areas of research as a result. Genetic research offers, and demands, artists' attention because of issues of scientific authority, notions of biological and cultural norms, and the real and supposed transformative possibilities of biotechnology touted by popular media. I became interested in genetic work in my own practice, moving from networked installations, online games, and viral computer applications toward physical and biological manifestations of such work. One current research project incorporates the use of bacteria and products of everyday life in an attempt to understand what science considers dangerous, beneficial, or useless material, and to examine such categories under a lens necessarily critical of scientific discourse. Clearly, scientific process is at the crux of meaning and material in biologically based art forms.

The main line of inquiry in this paper is to explore whether women working at this frontier employ alternatives to scientific process in their "science-influenced" creative practice. How do both the means and the ends of women's biologic practice differ from an area historically dominated by traditional scientific practice? Amy Youngs, an installation artist, points out in her essay "The Fine Art of Creating Life" that a clear mark of a biotech artist's work is a creation that does "not reinforce the hierarchy that places humanity at the apex."[4] Is this happening, and how would such a restructuring manifest itself?

There are three important conceptual territories which have become vital areas of biotechnology art research. First, there are works that stand alone as modified beings or objects, which originate from the ideas and work of the artist. Second, there are works created by artists to react, change, and survive within a particular set of circumstances or environments. The third category goes further to question the very means and process by which the work is produced.

I'll explore these ideas by examining the work of several contemporary artists. Significant alterations in the pieces discussed here include the role of process, the role of the author/creator, and the contradictory role of technology in the works. The stakes in this investigation are high; scientific processes must be examined and questioned when considering the rhetoric of creation, mutation, reproduction, and cloning, for these concepts and languages function amidst traditional rhetoric, techniques, and processes from scientific venues. In exploring products, environments, systems, and processes, the artists discussed here call attention to the social aspects of science.

2. ORIGIN OBJECTS

The exploration of creation—asking "what is the origin?" of ideas, organisms, of life itself—is particularly important to biotechnology artists working at the cutting edge of art and science research. The artist Eduardo Kac has set several precedents in this area. Kac began breaking the "body boundary" with his work *Time Capsule* (1997), which featured a chip implant in the body. Bodies are further explored in his transgenic art. In his most well-known work, *GFP Bunny* (2000), a rabbit was bred and genetically modified for Kac by scientists in France. This transgenic work was the creation of a rabbit which, through genetic manipulation, glowed green under certain lighting conditions. The bunny, Alba, is a product of "original" thinking, that is, the work explores the ethics and cultural implications of authoring life, indeed, the origin of life, and the piece is heralded by many critics as signaling a significant shift in conceptual art practice. Kac notes that phase one of the project is the birth of Alba[5]— not the process of creating her or the scientific processes involved in her genetic modification. His most recent works, *Genesis* and *The Eighth Day*, push the authorship implications of creating synthetic transgenic life forms. *Genesis* encodes biblical language into cells of microbes. As in the Bunny project, Kac directed a laboratory to encrypt his version of a Biblical phrase, "Let man have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moves upon the earth," first converting the language into Morse code, then into four letter DNA patterns.[6] Building on Genesis, *The Eighth Day* encompasses both the creation of and the environment for the organisms: the organisms live inside a visible exhibit/habitat. Kac argues that *The Eighth Day* offers an expansion to traditional ways of considering biodiversity by offering forms beyond those naturally available.[7]

Clearly these projects offer compelling examinations of bioethics and the power of creation. Kac's work has been important for the number of ethical issues brought into mainstream and artistic discussion. The viewing of the creation of life as a discrete act, however, and the "product" focus of genetically based artwork is problematic for many artists, scientists, and critics of contemporary culture. Artists such as Christine Borland work to examine the issues of production and reproduction of life in context.

Reproduction issues have been a central concern for feminist scholars, critics, and theorists, so it is no surprise that a handful of women artists have delved into reproduction and cloning issues. Like Kac, Scottish artist Christine Borland interrogates issues in human genetics. Rather than focus on outcomes, the artist concentrates on the questions of authorship, ownership, and individuality. Her *HeLa Project* (2000) explores the problems with high-tech monitoring and flagging of reproductive processes that map "undesirable" genes.[8] Borland notes that certain health conditions are "marked as problematic" during the course of pregnancy, but then goes on to question the motivation behind such marking: because such conditions are often incurable, the "monitoring" and advisory role of technology becomes instead one of elimination of the gene or the gene carrier. Her work *Spirit Collection* (1999), developed in cooperation with scientists at the Scottish Wellcome Institute and the Glasgow's Medical Research Council, features living cells of 1950s African-American cancer patient Henrietta Lacks. The cells were originally taken for scientific research from Lacks after her death in 1951. Since then, the cells have continued to duplicate and grow so

now more of her cells exist than when she was alive. This case spurs an important debate about who owns research cells and the length of time research on human cells can be conducted. Borland's work pushes both the material and social questions by using Lacks' cells herself, exploring issues of DNA as property, a person's rights to his or her genetic materials, and issues of race and class in scientific research.[9] This work carefully examines the sets of assumptions necessary to produce new cells and new life artifacts.

The artist's intention in biological creation differs from corporate research groups and the biotech industry. Yet unlike Borland, who is interested in how the system she designs is established on critically informed ties to its material world, questions asked by Kac in his work are narrower, focusing on the responsibility of the "creator" to the living genetic product rather than on the system which produces the organism, or the role of the organism within a system.[10] The critique Kac offers echos a science and engineering paradigm in which industry-driven scientific practices focuses on outcomes: engineering, specifically, tends to find "technological fixes to complex problems, and by ignoring the complexity, generates new ecological problems which are later defined away as 'unanticipated side effects' and 'negative externalities.' Within the engineering ethos it is impossible to anticipate and predict the ecological breakdown that an engineering intervention can cause. Engineering solutions are blind to their own impacts."[11] Similar to the way engineering fixes problems while ignoring complexity, scientists and engineers commonly conduct research without regard to the political nature of such work. This tendency extends into many areas of technology development, including hardware and software development. The emerging field of biotech or transgenic art must be read alongside this uncritical context. Artists who utilize transgenic processes in their work share a common understanding of the immense importance of the social and political ramifications in the use of genetic engineering and biotechnology.[12]

3. CIRCUMSTANCE OBJECTS

A key intellectual and artistic question in many projects by women artists concerns the circumstances in which the creation of the work lives. The development or study of particular environments is an essential element to these works, as is how the environments affect and change the life created. As an example, researcher/artist Natalie Jeremijenko created a series of projects dealing with environmental effects on similar or identical works. She notes in describing the context of the project, "cloning has made it possible to Xerox copy organic life and fundamentally confound the traditional understanding of individualism and authenticity."[13] Her multi-year *OneTree* project consists of one hundred trees that are clones of a single tree, grown in the late 1990s and planted in 2001 at various sites around the San Francisco Bay area, including private properties, schools, and Golden Gate Park. The project's goal is to explore the environmental influence on life by planting the trees in various locations, reflecting both the social and environmental conditions of cloning.

Cloning discussions revolve around the central concern over boundaries of the self and the other. This involves ethical issues that posit the creation of clones as "unnatural" or potentially unhealthy, as well as social and legal issues in terms of the way ownership, copyright, and other identity issues will be worked out.[14]

In the micro-biological work of Sabrina Raaf, the environmental influence on life is explored within a designed system rather than a "natural" environment. In her project *Breath II: Growing Pleasure* (1998), Raaf created a sculptural home for micro organisms, creating a host body complete with "organelles," or hollow body forms, connected with a network of latex tubes. Raaf created these artificial organelles by sculpting conduits in ground beef and then casting into clear rubber for tubing. The insides of the organelles and connecting tubes are coated with agar and house Serratia marcescens, a red colored bacteria. As the red bacteria grow, they move up the network of tubes, and "slowly (re)fill all the organs with life."[15] Conceptually, Raaf argues that "the lifeless meat (ground beef) that was used to create the organelles will be revived into a new self-sustaining, wall-mounted, organismal network."[16]

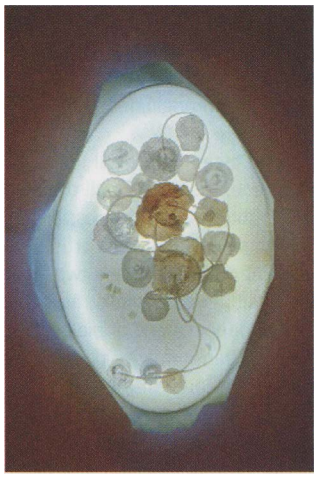

Figure 1. *Breath II*, Sabrina Raaf

Breath II grows a master organism that significantly represents the artist's process in conceiving the work: the sculpting of the tubes and conduits for future inhabitants out of ground beef suggests a preoccupation with the material body, flesh, and the transformative states of flesh. Works like Raaf's help us recall that life, human and otherwise, begins and ends in precarious environmental conditions and carefully constructed social conditions, bringing to mind feminist critiques of human nature as "socially constructed" rather than pristine, pure, or otherwise romantically natural. Thus, the focus of this work is both to rematerialize artistic practice and prioritize a life system over the logic of human desire. The Jeremijenko and Borland work explored here delves into notions of environmental effects and social conditions, while Raaf's considers these ideas in light of creating a new environment for created life forms.[17]

Cultural interest in science—in particular, biology—and the role of genetic makeup in determining life, are our most technologically advanced possibilities, where a desire for mimesis and anthropomorphism manifest in other life forms. How does the material and conceptual form and context of creation of genetic code influence artistic practice? As the sciences and arts merge in interesting biotech projects, it is intentionality of the research that distinguishes the divergent research goals of scientists and artists, and the ultimate role of the artist's work. However, the above projects do not fully reflect an in-depth critique of scientific process. The systems that are established in order to produce cloned trees, glowing rabbits, or biblical genetic translations require intensive examination to ensure they do not reproduce customary research results.

4. PROCESSES

With the failure of immersive virtual reality to immediately alter our everyday human experience, one may argue that bodies are the funda-

mental domain for the development of art. Some artworks adopt an ideology of mastery of the environment on a body system, turning bodies into frontiers for domination, control, and mastery. If scientific processes are not questioned alongside issues of the creation, reproduction, mutation, and environments in these types of works, the critique of practices in biotechnology and technologies of reproduction remains a hollow one. In order to comprehend their importance and political significance, the processes used to create biotechnological art must be questioned and brought to the forefront.

Andrea Zittel's project *Bantam Breeding* was originally intended to reflect all phases of life: creation, by raising bantam chickens; destruction, by killing the chickens herself; and preservation, through taxidermy. Through this process, Zittel could chart the system of objectification, creation, possession, and control of life, showing that "breeding is the ultimate form of ownership."[18] During the implementation of the project, however, she decided to focus on the breeding of the chickens. Zittel created her series of "breeding units" for encouraging certain aspects of bantam life over others in order to create a "more natural" bantam chicken as a long-term project.[19] Another unit, *Breeding Unit for Reassigning Flight*, is a nesting environment that is designed to re-encourage flight for the currently flightless breed by situating the egg nest high up in the unit. The *Breeding Unit for Averaging Eight Breeds*, allows cross breeding between the eight breeds of Bantam caged in the unit. Zittel has displayed the units as art pieces in order to make her breeding project and process public.[20]

Another project by Sabrina Raaf allows us to study the environments produced from and between human interactions, while also examining process, and just as importantly, touches on the ethnic and racial implications of biological work. Her project, *Breath Cultures* (1999), is an installation that explores environments: how space is socially defined, and how life from one organism to another is transmitted through space to new life environments. Using the breath of those visiting the exhibit, Raaf cultivates visitors' unseen "cultures" (i.e. oral flora) exhaled by the visitor/participants. "By making this visible by means of culturing the biological material of each breath, [Raaf] point[s] to an identity for the escaped space which exists between us. This is a space where cultures intermingle through the life of ideas and also of living biological material."[21] Raaf collected breaths from participants of 17 different ethnic and cultural backgrounds whose breath on agar dishes formed the "seeds" of the piece. The cultures were then left in the gallery to incubate.

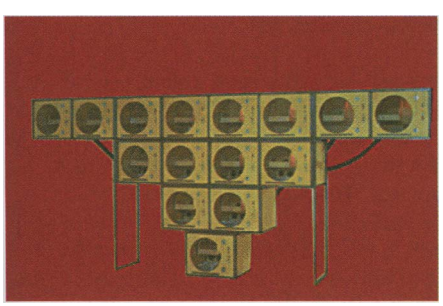

Figure 2. *Breath Cultures*, Sabrina Raaf

"The organisms which grew from each participant's breath embodied the biological (bacterial/fungal) portrait of that individual as well as that unique moment when their breath was taken."[22] Thus, Raaf's process and resulting project explores notions of time as well as space and material, and most importantly, pushes the notion of process and documentation of research steps to the forefront. The Raaf and Zittel works delve into the procedures in which creation and discovery are manifest. The discourse about these projects concerns not only ideas of creating life, but boundary spaces between "natural" and "unnatural" creations and spaces between the self and the other.

Other artists working in this area include Catherine Chalmers, whose work *Transgenic Mice* (2000), documents the process of producing genetically engineered mice in scientific settings; and Susan Robb, who sets up laboratory conditions for various projects in order to conduct non-hypothesis based experiments that investigate personal and social aspects of the scientific method. In all of the artists' work discussed here, the exciting and significant conceptual territories which have become cornerstone issues in biotechnology art research concern an integrated interrogation of the scientific processes used in both science and in creating biotechnological art.

The artistic discourse engaged with biotech and transgenic creative research helps us better examine the process of scientific creation and the placement of life. Such research creates ambiguities about notions of individuality; complicates polemics of gender and hierarchical, outcomes-based research processes; questions creation myths and the precarious question of "origins"; and asks us to examine the "natural" environment we in fact construct amidst a constructed culture.

5. CONCLUSION

For several decades, feminist scholarship in feminist ethics and reproductive technology, biotechnology, and genetic sciences has offered a powerful anti-utopian argument to the wonders of current and future body sciences. Feminist scholars have long had a particular stake in this area given the ties between women's bodies and gene therapy, cloning, and genetic reproductive issues. In addition, the stereotype of men as "hard scientists" has influenced the realm of genetic art. Those few women who are working at the intersection of genetic engineering and art have identifiable (and different) considerations than the trends in the movement overall. Yet, acknowledging that women's artwork might pose different questions to biotechnology and transgenics carries with them a very real danger of lumping women artists interested in biology into a separable, homogeneous group with some kind of "unified female essence."[23] This too is problematic. However, a discussion of trends and specific works should offer a range of responses, and allows us to recognize ever more varieties and author(itie)s in this area of inquiry and practice.

Feminism as a critical discourse is not often utilized in high tech arenas, and has not been a principal component in discussions about or the evolution of biotech art.[24] In these projects by women artists, however, there is true experimentation with definitions of life, difference, and environmental factors in genetic art, which grapple with issues sprouting from parallel developments in the sciences. In this context, the artist's work is perhaps more effective than feminist critics and theorists who are bound by hierarchies in language and thus have difficulty reworking the very hierarchical arguments and academic processes so often critiqued. By uncovering the very rules and processes governing scientific exploration as conceptual processes, women artists are calling attention to the social construction of science and the social and environmental contexts for art, science, and life. A crucial shift in perspective from object to process helps to move beyond the deadlock of conceptual art's true power to rethink systems. Amy Youngs's consideration of a biotech artist's work as a creation that does "not reinforce the hierarchy that places humanity at the apex" seems to be mostly true for women

artists working in biological art, artists whose work also receives less attention than other transgenic authorities and artists.

This brief exploration is not an attempt to create a new canon of feminist transgenic artists or a label for women transgenicists; rather, its goal is to expose the variety of threads operating in biological art and poke holes in the narrowly defined canons of technological art, which remain in the 21st century a handful of well-known names in the tradition of institutionalization. It is important to keep in mind that women artists who are working in the hybrid area of art and science are at least partly informed by a history of feminist scholarship in the zone between science and art. By breaking open canonical tradition, we follow the feminist critiques of science, ethics, and knowledge and apply them to biological art.

Biological art helps us understand our epochs, environments, sciences, and selves. Both natural and scientific processes—transitions, becomings, and transformations—have historically been veiled practices. We have responded by putting order into the succession by invoking empirically established but literally unintelligible sequences. If we consider product, environment, and process to be core elements of biological art, we are able to "situate processes and work toward material change without falsely seeking transcendent, static truths."[25] These conceptual projects can help the sciences (and the public at large) identify the social, environmental, and communicative importance of biotechnology and biological manipulation.

REFERENCES

Gibbs, W. 2001. Art as a Form of Life. *Scientific American*. http://www.sciam.com/2001/0401issue/0401profile.html

Grosz, E. ed. 2000. *Becomings: Explorations in Time, Memory and Futures*. Ithaca and London: Cornell University Press.

Hofmann, I., Wittkopp, G., and Wilson, D. 1999. *Weird Science: A Conflation of Art and Science*. Bloomfield Hills, Mich: Cranbrook Art Museum.

Jeremijenko, N. *OneTree*. http://www.cat.nyu.edu/natalie/OneTree/OneTreeDescription.html

Levy, E.K. 1996. Contemporary Art and the Genetic Code: New Models and Methods of Representation. *Art Journal* 55:1, 20-25.

Mahoney, R. 2000. Christine Borland. *Artnet Magazine*.

Meskimmon, M. 2000. Historiography/Feminisms/Strategies. *n.Paradoxa* 12.

Penny, S. 1995. Why Do We Want Our Machines to Be Alive? *Scientific American*. http://www.art.cfa.cmu.edu/penny/texts/sci_am_Golem.html

Raaf, S. Breath Cultures. http://www.raaf.org/

Rapoport, S. 1998. The Transgenic Bagel: The Transformation of Computer Based Artwork. *Leonardo* 31:4, 271-275.

Seabrook, J. 1990. Biotech Bondage. *New Statesman*, 17-19.

Shiva, V. A Third World Perspective on Biotechnology. http://www.psrast.org/vashbiot.htm

Stein, L. 2001. Smile Tomato. *Paradise Now* exhibition. http://www.geneart.org/stein.htm

Toma, J., Akhavan, M., Fernandes, K., Barnabé-Heider, F., Sadikot, A., Kaplan, D. R., & Miller, F. 2001. Isolation of Multipotent Adult Stem Cells from the Dermis of Mammalian Skin. *Nature Cell Biology* 3:9, 778-784.

Wright, R. 1994. Feminists, Meet Mr. Darwin: The Evolutionary Psychology of the Female Mind. *The New Republic* 211: 22, 34-42.

Youngs, A. 2000. The Fine Art of Creating Life. *Leonardo* 33:5, 377-380.

Zelevansky, L. 1994. *Sense and Sensibility: Woman Artists and Minimalism in the Nineties*. Exhibition catalogue. New York: Museum of Modern Art.

NOTES

1. Sonya Rapoport makes references to the artistic and historic concept of the golem as early biotech art, and as art historian Ellen Levy has pointed out, as early as the seventeenth and eighteenth centuries works were suggestive of genetics in the way they present "natural evidence" in the context of a "great chain of being." Such shapes and forms were evidenced in the pre-Darwinian illustrations of Jan Brueghel II and David Tenniers the Younger. See Levy, 1996.
2. Eighteenth-century robots, such as the "scribe" by Jacquet Drosz which could write, or the mechanical orchestra and robotic duck by Jacques de Vaucanson which flapped its wings and ate, were developed at the same time as the first programmable device, the Jacquard weaving loom, and were constructed according to mechanical "logic" similar to Babbage's difference engine architecture. See Penny, 1995. For more information on Jacques de Vaucanson's duck, see info and diagram at http://www.personeel.unimaas.nl/H.Schotel/Eendjes/Vaucanson-eend.html
3. For example, new research by Freda Miller and colleagues at McGill University shows that scientists are able to retrieve stem cells from adult skin, thus making tissue for cloning and other biotech purposes readily available. See J.G. Toma et al, 2001.
4. Youngs, 380.
5. http://www.ekac.org/transgenicindex.html
6. Roberts, K. 2001. Transgenic Art Raises Issues About Life And Ethics. *Inside IT.* http://www.asu.edu/it/fyi/insideit/2001/05/article4.html.
7. http://www.ekac.org/transgenicindex.html
8. Mahoney, 2000.
9. http://www.henryart.org/gene-sis/artists_borland.html
10. In addition, artist Joe Davis wishes to battle science's representation of who we are by sending broadcasts into outer space. "By making this attempt to communicate with the other," he explains, "we're really communicating with ourselves." Joe Davis in Gibbs, 2000.
11. Shiva.
12. A parallel investigation to this paper would be an exploration of feminist critiques of modified foods and bodies from developing countries. Feminists like Vandana Shiva from developing countries, and Susan Wolf from the West, argue that the genetic manipulation of crops, animal, and human bodies are complex, non-binary situations that ultimately create more problems than they are able to solve. Artificial foods from the West, for example, are a manifestation of the West's bio-imperialism in developing nations. (Seabrook, 1990.) Vandana Shiva argued in the early 1990s that the importance Western society places on masculine scientific creation and the low value accordingly assigned to feminine

procreation legitimates the encroachment of technological development into both the female body and the seed, allowing the authority of scientific expertise to influence many facets of life. (Shiva, V. 1992. The Seed and The Earth: Women, Ecology and Biotechnology. *The Ecologist* 22:1, 4-8).

13. Jeremijenko, *OneTree*.
http://www.cat.nyu.edu/natalie/OneTree/OneTreeDescription.html
14. Science's relationship to women's bodies in particular is too large an issue for the scope of this exploration, but it remains an important and related area to explore.
15. Raaf, 1999. Artist's statement on personal Web site.
http://www.raaf.org/
16. Ibid.
17. More work explicitly treads in both territories, such as Laura Stein's Animal-Vegetable project in which Stein enclosed baby vegetables into copyright-protected, animal-shaped molds to shape the vegetables' physical attributes. See "Paradise Now Exhibition: Smile Tomato."
http://www.geneart.org/stein.htm
18. Zelevansky, 1994. Available online at:
http://www.zittel.org/Pages/text-mmomasenseandsensibil.html
19. Hofmann et al, 1999.
20. Ibid.
21. Raaf, 1999.
22. Ibid.
23. web.ukonline.co.uk/n.paradoxa/panel7.htm
24. Wright, 1994.
25. Meskimmon, 2000.