

Perceptions of Promise: Biotechnology, Society and Art (First Draft)

'What is the best way to describe biotechnology and its impact on our everyday lives?' I asked myself, while seated in a doctor's office. I was stressed about writing this essay, its deadline drawing ever nearer. All the same, instead of dutifully sitting in front of my computer and hashing out my ideas, I was consulting with a dermatologist about the fatty deposits that were collecting under my eyes, worsening my already noticeable eye bags. As an ardent feminist—I had even brought a copy of Cressida Heyes' *Cosmetic Surgery: A Feminist Primer* to read in the waiting room—I felt a certain shame about my priorities. I had nevertheless decided to do something to improve my ageing appearance, depending on the price point. Looking around the reception area, I noticed shiny glass cases filled with skin tightening products, creams promoting cell regeneration, pamphlets offering hope to people suffering from 'excessive sweating,' and advertisements for laser hair removal as well as treatments that could 'take off what diets won't.' To my left a computer monitor displayed before and after photos of eyelid surgery, which had 'restored a more energetic and youthful appearance' to a woman who might have been around fifty years old. It was difficult to tell. I suddenly realized that I was already immersed in biotechnology; I was, in fact, eagerly seeking out its transformative effects.

Health Canada defines biotechnology as encompassing a range of scientific activities that use 'living organisms or parts of living organisms to provide new methods of production and the making of new products' (www.hc-sc.gc.ca/sr-sr/biotech/index-eng.php). The examples of bioproducts provided on the Health Canada Web site are mostly positive, offering social rather than strictly individual benefits: new vaccines to prevent disease, genetically modified plants with resistance to pests, treatments for human infertility, bacteria capable of cleaning up oil spills, and environmentally friendly biofuels. These promised improvements to the human condition are regularly discussed in the media, often accompanied by optimistic predictions of a future in which stem cells—unspecialized cells which are the building blocks for every organ and tissue in the human body—are harvested and engineered to grow replacement parts. This utopian vision is matched, and in many cases overwhelmed, by a dystopian one in which scientists bioengineer monsters that ultimately destroy humanity, or manufacture reproductive technologies that support genetic discrimination. The latter fantasy is depicted in the film *Gattaca* (1997), which features a society that uses biometrics to distinguish individuals with superior genetic profiles from people born without the aid of technological intervention, and thus considered more susceptible to future physical and mental dysfunction. While influential, such popular representations have little connection with the practices or goals of contemporary scientists. These professionals might, for example, devote their careers to determining the role of a single protein in the renewal of a particular kind of stem cell, or use primate embryonic stem cells to explore

pluripotent activity, that is, the capacity of these cells to transform into many different cell types.

Though laboratory science and the popular imagination diverge in significant ways, biotechnologies have undeniably altered established ways of thinking about life. On one hand the manipulation of living organisms for human ends is not new; even Neolithic agricultural practices involved improving plants and domesticating animals. On the other hand, such interventions have both increased and intensified during the last two decades, perhaps most obviously in the field of health care. Scholars distinguish the current situation, which they characterize as biomedicalization, from the kind of medicalization that has occurred since the late nineteenth century. The authors of a recent book, *Biomedicalization: Technoscience, Health, and Illness in the U.S.*, for example, argue that whereas medicalization asserts control over disease, injury, and bodily malfunction, 'biomedicalization practices emphasize *transformations of* such medical phenomena and of bodies, largely through sooner-rather-than-later technoscientific interventions not only for treatment but also increasingly for enhancement' (2010, 2; italics in original). In the past, the processes of medicalization construed aspects of life previously considered outside the jurisdiction of medicine, such as alcoholism, obesity, childbirth, menopause, and unattractiveness, as conditions that could be diagnosed and treated. Biomedicalization not only extends these effects, but shifts from directing nature to remaking it by, for instance, restoring bodies to life after complete heart failure, enabling post-menopausal women to give birth, or genetically

designing vegetable, animal, and human life (*Biomedicalization*, 2010, 55). A less dramatic illustration of biomedicalization is offered by the changing techniques of hair removal, a topic presented to me in my doctor's waiting room. Once hair is labeled excessive or unwanted, it can be removed through shaving, waxing, or the application of chemical depilatories. The biomedicalized response, however, seeks to alter the body's capacity to grow hair at a cellular level. Laser hair removal uses selective photothermolysis to target the pigment of the hair, following it down into the follicle to destroy the cells responsible for hair growth. This relatively permanent and costly reconstruction of the human body is now widely available. Though apparently banal, the popularity of laser hair removal points to a significant cultural shift in which all kinds of physical problems are solved by altering the cellular structure of the human body. At the same time, such interventions are promoted in terms of producing or maintaining health, a generalized concept that refers, not only to the management of illness and disease, but also to the pursuit of the appearance of health by informed consumers (*Biomedicalization*, 2010, 99).

Within this biomedicalized framework the entire human body and indeed life itself is understood to be open and available for reconfiguration. The acceptable limits and goals of this reconfiguration are hotly debated by, among others, bioethicists, policy makers, scientists, sociologists, physicians, and anthropologists. They address such issues as the status of the so-called 'spare' embryos created, but never used, for in vitro fertilization or IVF treatments (are they private property or potential human life?), the

commodification of bodily tissues (should human ova be bought and sold?), and the precise nature of informed consent (are patients' decisions about medical procedures ever made outside of hierarchies of power?). Given the complex and often technical nature of these debates, it is sometimes difficult for the 'general public,' or at least for non-specialists, to participate. What, for example, could someone who makes art for a living contribute to these ongoing discussions? Quite a bit as it turns out. Artists have addressed biotechnology, insisting on their role in shaping this important realm, since at least the 1930s. That is when the American photographer Edward Steichen employed genetic manipulations to create gigantic, hybrid delphiniums which he then exhibited in galleries (Gedrim, 2007). More recently, a range of artists has begun both to interact with and criticize biotechnologies with renewed vigour, by culturing bacteria, sculpting with proteins, fusing their white blood cells with mice myeloma, and cloning walnut trees. Sometimes called bioart, these works involve such living organisms as plants, animals, bacteria, and tissue culture (Vita-More, 2007). Other artists explore, resignify, and challenge scientific methods by creating work that utilizes more traditional media, including written texts and digital representations (Anker and Nelkin, 2004). Few of these artists adopt a dogmatic position either for or against certain biotechnologies, nor do they follow conventional philosophical protocols for formulating and then defending arguments. Most of them are committed to understanding the lived realities of biotechnologies, offering new ways of thinking about them, and inviting a wider public to

interact critically with them while exposing the often unacknowledged forms of authority that can inhibit that interaction.

The artists featured in *Perceptions of Promise: Biotechnology, Society and Art* similarly promote engagement with and debate about the current epistemological and material transformations of life. They produced the work for this exhibition after participating in a workshop in April of 2010, which included philosophers, sociologists, legal scholars, and scientists discussing the manifold legal, ethical, and social issues arising from recent innovations in biotechnology, particularly those related to stem cell research. Even as they drew on their own specialized training and ways of seeing the world, all participants strove to see differently by pursuing sincere forms of collaboration. This cooperation continued after the workshop ended, with some artists and stem cell researchers sending each other e-mail messages, drawings, scientific images, and ideas. Material traces of these exchanges are evident in a number of the art works in the show; scientific terms are imprinted on cloth, hand-drawn imaginative diagrams are embedded within layers of other images, and scans of a human blastocyst or pre-embryo are enlarged and reshaped to encompass viewers.

Marilène Oliver worked with stem cell researchers Jennifer Nichols and Mila Roode of the Wellcome Trust Centre for Stem Cell Research in Cambridge, and Peter Rugg-Gunn of the Hospital for Sick Children in Toronto—he was also a participant in the *Perceptions of Promise* workshop—to create *Keep Me Safe From Harm* (2010). Using the colourful scans of a human blastocyst provided by Rugg-Gunn, the artist printed and

reassembled them into a kind of protective pod, large enough for an adult to enter. Though the scans were originally intended to record the embryo's structure, Oliver has changed them into a material entity and spatial environment, an alteration that functions on various levels. Her inflation of a microscopic image suggests the potentially exaggerated status of the embryo within contemporary culture. The human embryo has indeed become an iconic object, standing in for a range of beliefs and ideas, including life, progress, and hope. At the same time, stem cell research and such technologies as preimplantation genetic diagnosis (PGD), when a single cell is removed for testing from an early embryo created using IVF technologies, indicate that the embryo is increasingly malleable and 'constructed,' a term used by Jane Maienschein and Jason Scott Robert in their account of the shifting historical understandings of the embryo (2010). This unstable object can be claimed and resignified by others once it has been separated from the maternal body. It can even be commercialized, leading Sarah Franklin to describe contemporary embryos as 'a vast and diverse population, imaged, imagined and archived in media as diverse as liquid nitrogen, DVDs, virtual libraries, t-shirts, logos and brandnames' (2006, 168). It is unclear whether the title of *Keep Me Safe From Harm* is a plea emanating from the embryo in the face of this exploitation and use, or a request made by viewers as they enter the embryo's embrace, putting their faith in the research that it enables.

To produce the work *Split Petcetrrix* (2010), Oliver downloaded CT scans of an anonymized human body from the internet, threading the vertical sections together to

create a three-dimensional form that can be stretched apart to reveal its interior. This rematerialization of an objectified human torso and head is rendered in foam rubber, its red colour suggesting viscera and blood, while the thousands of golden beads glisten like globules of fat. *Split Petcetrrix* was influenced by the workshop in April, where Oliver learned that adult stem cells are harvested from the fat removed during liposuction procedures and then included in cosmetic face creams. Though using such corporeal extractions for cosmetic and medical purposes is not new—early modern Europeans, for example, included dried blood and bones in various elixirs and unguents—the contemporary commodification of almost every part of the human body is striking. Such scholars as Margaret Lock (2001) and Catherine Waldby and Robert Mitchell (2006) have written about how exchanges of human tissue and blood have increasingly shifted away from the gift economy and towards the commercial realm. With her luxurious and appealing art work, Oliver draws attention this form of biomedicalization, asking viewers to consider how they relate to and consume the recycled and represented human body.

Working collaboratively, Liz Ingram and Bernd Hildebrandt produced *Differentiating Faith* (2010) which, like Oliver's *Keep Me Safe From Harm*, creates a space for audiences to experience. Their tent-like installation is immersive, enclosing visitors within fabric flaps printed with images of water, overlapping male and female bodies, written scientific terms, and the images of stem cells provided by workshop participants Peter Rugg-Gunn and Paul Cassar, a stem cell researcher at the University of Toronto. The peaked structure of Ingram and Hildebrandt's installation is carefully designed so that

viewers move through the space and reach an apex before exiting to face a wall painted in a blood red colour. The mirrored surface beneath the viewers' feet reflects their bodies, making them literally part of the work. Walking through *Differentiating Faith* is thus potentially confusing because multiple corporeal images meld and overlap, but at the same time the richly coloured fabric creates a warm and nurturing environment. According to the artists, experiencing their installation might feel like moving through a body, recalling the 1966 movie *Fantastic Voyage*, which portrayed miniaturized researchers navigating a tiny nuclear submarine through the veins and arteries of a human body. This science fiction fantasy takes on a more practical reality at the Sun Center of Excellence for Visual Genomics, located at the University of Calgary. There an automated virtual environment, colloquially known as the CAVEman, uses four projection walls to surround scientists with bioinformatics in the form of three-dimensional models of cells, tissues, and entire organisms. Continuing the historical quest to render the human body transparent, the CAVE conflates seeing with knowing. In contrast, *Differentiating Faith* troubles this association, producing visual uncertainty and a sense of wonder rather than mastery. The suggestion that knowledge cannot be separated from embodied experience and personal belief is reinforced by both the title of *Differentiating Faith* and the ritualistic nature of entering and exiting from it.

The series of drawings made by Daniela Schlüter in 2010 continues to highlight the embodied viewer, though in two rather than three dimensions. As visitors approach the works—each consists of a large piece of heavy watercolour paper thickly layered

with smaller monoprints and drawings first made on thin Japanese paper—they may initially discern general forms, but can perceive images of birds, chairs, heads, and then chromosomes, marks, and lines as they move closer and closer. Requiring the intensely close looking often employed by scientists, Schlüter's work restages the scientific gaze which moves relentlessly inward, from bodies to cells to genes and proteins. Her works feature bodies and their interiors, including pictures of her own chromosomes, which she commissioned from a laboratory. Indeed, most of the layered photographic images are personal, taken by the artist during her travels; others were hand drawn and relate to her body. Schlüter delineated the labyrinth, for instance, while walking the tiled version at Chartres Cathedral in France. Each reproduced figure, including the raven, rabbit, and goat that populate the series, has a specific meaning for the artist, but also remains open to the varied interpretations of viewers. Although some signifiers have conventional associations—hares are regularly linked with fertility—for the most part they remain mysterious. This sense of mystery and the ambition to overcome it relates to the scientific drive to see and to know, a mission directly invoked by a diagram provided by the scientist Paul Cassar, produced when Schlüter asked him to imagine what his research subject, the protein Makorin-1, looked like. Despite intensive study and important discoveries about how this protein is regulated within embryonic stem cells, its precise function remains unknown. Schlüter invites us to contemplate and appreciate the unknown, or the not yet known. With her repeated representations of chairs, she asks viewers to rest in this place between the known and the unknown, to slow down and

think about how biomedicalization is altering human bodies and the definition of humanity itself.

Sean Caulfield and Roy Mills' *End Point* (2010) is a collaborative installation that continues to address scientific practices, reflecting on how understandings of nature are produced using specific materials, machines, and techniques of representation. The three large woodcut prints made by Caulfield portray organic forms that invoke scientific diagrams but are difficult to classify. Woodcuts were an important method for disseminating knowledge during the Middle Ages and Renaissance, inked and run through the printing press to produce multiple copies of illustrations for a range of publications, including medical books and anatomical treatises. Caulfield's monumental prints recall the role of woodcuts as tools for spreading information, but also reference sculpture, having been made through the physical process of incising wood. Their textured surfaces remind viewers that an artistic hand invented them and, by extension, that scientific knowledge is produced by the physical and intellectual labour of human bodies. This attention to the tactile nature of printmaking may also have been encouraged by Caulfield's ongoing dialogue with Mills, a sculptor. Mills' material contribution to *End Point* is a large cage-like structure made of wood, steel and fabric. Its grid references the geometrical aspects of scientific measurement, balancing not only the predominantly organic forms in the prints made by Caulfield, but also the mysterious cloth organ contained within it. As viewers walk up to and around this installation, they

can animate it by using the bellows to inflate the bladder-like form, forcing it to expand and press against its enclosure. This act reiterates the link between physical labour and knowledge, additionally drawing attention to the machines long essential to scientific practice. Like the work of Schlüter, Mills' ominous apparatus is puzzling, its precise meaning unclear. According to both Caulfield and Mills, *End Point* is deliberately both whimsical and menacing to invoke the emotions of hope and anxiety that currently surround biotechnology.

The large multi-paneled works produced by Shona Macdonald, called *Finger Lakes* and *Bodies of Water* (both 2010), continue to explore the relationship between human bodies and the natural world, though with an emphasis on the physical act of mapping the land. While driving through the Finger Lakes region in west-central upstate New York, Macdonald noted the anthropomorphizing name given to the chain of lakes that run along a north-south axis. These lakes of varying sizes and depths resemble fingers loosely, and only when seen drawn on a map. The characterization of the lakes as human hands ultimately derives from representational practices that rely on resemblance, but are mostly symbolic, requiring knowledge of learned conventions in order to become legible. With its repeated and overlapping blue, violet, and green lines, *Finger Lakes* recreates the mapped vision of flowing water. Macdonald has additionally drawn fractals in the crevices between the cascading strokes of water, alluding to the fractal geometry developed by mathematician Benoit Mandelbrot. This mode of representing the natural world in terms of irregular mathematical shapes in repeated

patterns is now used to design roads and even ships. Macdonald highlights the natural basis of these self-repeating scientific forms, skewing the scale of her fractals, and likening them to the branches of trees and the veins in leaves. At the same time, both *Finger Lakes* and *Bodies of Water* address the longstanding practice of interpreting landscape with reference to the body; oceans and seas are understood as bodies of water, lakes and rivers described as fingers. This projection of human form into the world is embedded in traditional units of measure, such as the *braccia* or arm-length used to quantify architecture and land during the Italian Renaissance, or the more recently used Imperial unit of the foot. Classifying space by extending the human body could be considered a possessive act, in keeping with cartographic efforts to visualize spatial distributions in order to legislate borders and decree property lines. Macdonald is, however, also interested in the personal relationships forged between bodies and places, contemplating how we experience landscapes in terms of memory and particular events. Maps of such places may become familiar, reassuring, and even banal everyday objects. Yet they figure a kind of bodily separation, requiring viewers to adopt a distant view from above. With her encompassing and active images—the paper itself has body and moves—Macdonald plays with all of these possibilities, offering layered works that are open to the memories and bodies of the viewers that approach them.

The photographic series called *Logos*, begun by artist Clint Wilson about five years ago and continuing to the present, reveals another kind of human effort to control and remake nature. Each large-scale image features one or sometimes two butterfly

specimens along with the labeled envelopes in which they were originally collected. The handwritten or typed information on these envelopes indicates the species type, its gender, and the time and place of its capture. The writing that surrounds the small insects assigns them mostly Canadian or American identities, but at least one photographed specimen is accompanied by almost no text at all, highlighting our limited knowledge of it. Wilson's series is at once historical and contemporary. It restages the techniques of natural history, a broad field of knowledge encompassing geology, zoology, and entomology practiced primarily by amateurs during the late nineteenth and early twentieth century. During this period, natural history societies were active across North America, with both male and female members engaged in exploring the natural resources of their regions by collecting, identifying, and trading such items as minerals, fossils, bird skins, and shells. Butterfly hunting was an especially popular endeavour, spurred on by the beauty, availability, and diversity of the insects. Natural history enthusiasts often arranged butterfly collections for edifying display within the home, or donated them to fledgling local museums. This consumption of natural history eventually allowed mail order businesses to purchase insects and other specimens in bulk before distributing them to societies, schools, and museums. Some of these companies still exist; indeed, that is how Wilson purchased the specimens used in his art work. Linking the past with the present, the artist shows that the commodification and corporatization of nature is not new. Yet by imprinting logos directly on the photographed butterflies, marking them with brand names of the forestry or biotech companies occupying the land where the specimen was collected, Wilson suggests that these processes have reached

new heights. His hybrid creatures are not simply harvested and labeled; they are structurally altered in a way that renders nature and culture indistinguishable.

Another kind of hybrid winged being is portrayed in *Migration Cell Theory* (2010), a video made by Derek Besant. After undertaking photo-based research, the artist produced video sequences that resemble short documentary clips. In them, the viewer is positioned above what appears to be a laboratory setting, equipped with tools, sinks, plastic hoses, and rubber curtains. Like a surgeon or other medical practitioner, the viewer masterfully gazes upon the figures lying on a table beneath them. The prone human specimens have been subjected to experiments meant to insert large genetically altered wings, perhaps grown from the DNA of birds or insects, into their bodies. This suggestion of mixing species relates to an actual scientific practice called interspecies somatic cell nuclear transfer, in which an embryonic cell from one creature (such as a chimpanzee) is introduced into the unfertilized egg from another animal (such as a cow) from which the nuclear DNA has been removed. Cell division of the new hybrid is artificially induced and can then be implanted in the womb of a surrogate. The first cloned mammal was produced in 1997, but in that case Dolly the sheep was produced not from an embryo but from an adult cell (Cibelli and Wang, 2010). Drawing on the currently intense interest in cloning, Besant's work visualizes the bioengineering of human hybrids, a looming possibility that terrifies some people. Such fears are longstanding and have often been explored in film, including *The Fly* (1986), which features a scientist who accidentally melds his body at a molecular-genetic level with

that of a common house fly. With *Migration Cell Theory* Besant reveals that anxieties about hybrid monsters that are neither clearly human nor non-human continues to haunt the popular imagination, influencing responses to stem cell research and other forms of biotechnology.

In the end, the art works exhibited in *Perceptions of Promise: Biotechnology, Society and Art* both elicit participation from viewers and are in dialogue with each other. Despite their diverse media and the different approaches of the artists who made them, all of the works in the show insist on the relationship between embodied experience and the production of scientific knowledge, reveal a fascination with the modes and means of scientific practice, and highlight mystery by drawing attention to the value of uncertainty and the presence of the unknown. Although visitors are directed around and sometimes through the art works, they do not convey a simple didactic message but are meant to encourage a broader way of thinking about biotechnology. Many of the works in *Perceptions of Promise* enable the realization that I had while visiting the doctor, namely that biotechnology is a pressing concern currently reshaping our bodies and ourselves. We are surrounded by it, desiring it, using it, living it, becoming it, refusing it, and resisting it all at once.

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