Bioremediality: Biomedia, imaging and shifting notions of liveliness across art and science

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ABSTRACT

Bioremediality: Biomedia, imaging and shifting notions of liveliness across art and science

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Biomedia and imaging practices have an important role to play in the representation, construction and generation of life and liveliness. *Living Viral Tattoos* is a research-creation project that reflects on tissue culture engineering practices of imaging cellular life in the laboratory. Various media art works created as part of the research conducted while culturing cells in the laboratory are referred to as "bioremediale images". The concept of bioremediality is proposed to reconsider biomedia and images as biosubjects in an era of global risk culture. The multi-dimensionality and liveliness of bioremediale images is situated as a (bio)remediation of images, materials, human and non-human entities across artistic and scientific processes. This dissertation proposes that an expanded range of literacy across the fields of media arts and life sciences is necessary to perceive and "read" images of life and liveliness.

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The dissertation writing is inspired by earlier texts written during and after the completion of my doctoral residency at SymbioticA. I thank the excellent editors and publishers at Performance Research, Leonardo Journal and Total Art Journal for their permission to include those articles in the dissertation.

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Dedicated to the memory of Mr. Sandvoss.

Never underestimate the influence of high school art teachers.

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"But to make the story immortal,
The show must be filmed:
With cameras of special make
With a little twist and a little shake
With the trick A and the trick B
And Behold! What do we see?
We see exactly what we have related before,
And there is no use of seeing more."

From "A reply" by Petar Martinovich (Squier 84)

I. INTRODUCTION

Petar Martinovich wrote this poem at the turn of the twentieth century while working as a research scientist on some of the earliest experiments with cell culture in the Strangeway Laboratories. Martinovich's cynical response to cinema photomicrography (time-lapse photography) developed by Ronald George Canti was, in part, a concern for the ability of the "new media" to represent cell culture as a spectacle.[1] His concerns reveal the deeply entwined

[1] Susan Squier notes in her book *Liminal Lives* of the concern that scientists later had of such imaging processes to turn cell biology into a type of Disney animation or Disneyfication.

relationship of science and culture embedded in the representation of life, liveness and liveliness through images. The illusion of cellular movement created by time-lapse photography and film radically shifted not only the use of film as proof of microbial life in science; it also exposed the public to new ways of seeing life, not always the most scientific of perspectives. Film and the Canti technique had a large role to play in the emerging field of microscopy and microbiology at the time. "The Canti technique played a central role in producing the tissue culture point of view, shifting science from the static and graphic to the dynamic and photographic" (Squier 76). In many ways, this shift from observing live cell culture through the microscope to its animation via film resonates with many concerns specific to documentation practices in media and art where the image may be assumed to be representative of a live event, action or person.

My practice as an artist over the years has focused on the tensions of live events, liveliness and documentation processes. Similar to Martinovich, I have an ambivalent relationship to the image. As a practitioner of media and art, I manipulate and represent images and life contexts through various analog, digital and biotechnological technologies. Martinovich points out, the camera and the person behind it have a large role to play in the image construction. In various ways, my research-creation project *Living Viral Tattoos*, created as part of this PhD dissertation, attests to my uneasy relationship to authority and authenticity relinquished to the image. Of particular concern is how current biotechnology and bioimaging technologies are used to represent and establish life forms and notions of liveness. The rapid shift from analog to digital imaging technologies in the sciences has raised issues around media and image literacy in the sciences. For example, the number of retractions of scientific journal

articles and image documentation are on the rise due to image falsification and user error.[2] Furthermore, the process of creating images, the materials used and the representation of life forms through scientific imaging is often inaccessible to non-specialists. How can this noticeable gap in the perception and practices around the imaging of life be addressed?

Fig. 1: *Living Viral Tattoos*
Exhibited in the group show Toxicity (2014), curated by Melentie Pandilovski and Jennifer Willet at Video Pool Media Arts Centre in partnership with INCUBATOR: Hybrid Laboratory at the Intersection of Art, Science and Ecology and co-presented by Plug In ICA.
Photograph credit: Jennifer Willet (2014)

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[2] For examples of retractions there is an excellent website available on the blog *Retraction Watch*, run by science researchers. http://retractionwatch.com/

II. WHY BIOMEDIA?

In keeping with Martinovich's ironic poetic claim that there is no use "seeing anymore" given technological devices' capacity to animate life for us, I suggest that there is a need—now more than ever—to revisit how images generated through biotechnology perform and exceed representations of life and liveliness through the processes of mediation and remediation. With the growing importance of biomedia,[3] the processes and technologies of the engineering of life, the remediation of life forms via image representation are calling into question the very notion of life and liveliness. One of the major issues is that the practice of codifying life forms into the scientific lexicon via images, diagrams and models, while often visually compelling, may simultaneously render such images inaccessible to a non-science viewer. The scientific meaning of these images must be translated and relayed to the non-specialist, posing challenges to scientists, science journalists, and other science communicators who may not have the visual literacy skills of artists and scholars of visual culture required to convey the aesthetic and social-political dimensions of the representations, or how perception of life exceeds such representations. Artists, cultural producers or visual cultural theorists, on the other hand, may not have the scientific literacy skills required to read how images captured via techno-scientific devices like the microscope, assay, and time-lapse video construct, index and signify our understanding and reception of life through a scientific perspective. My proposition is that when both of these forms of literacy are brought together, the tendency to anthropomorphize the image of life in the human image may be circumnavigated, and a deeper, more nuanced and

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[3] I am referring to the term as defined by Eugene Thacker in *Biomedia.*

complex relation to life—one that recognizes the liveliness of the image in its complex modality.

My interest in this problematic became most acute when I began my training in the tissue culture laboratory during my doctoral field research residency at SymbioticA, The Centre of Excellence in the Biological Arts[4] situated at The University of Western Australian in 2007-2008. As an embedded artist and graduate student, I was trained to work hands-on in the tissue culture laboratory in order to explore theoretical questions relating to the movement of viruses through cell culture. My program of research was to rethink the performance of liveness at the molecular and cellular scale. While learning how to grow and image cell culture to explore such questions, I became troubled by the images I was creating with specialized imaging technologies such as the Scanning Electron Microscope, Fluorescence microscope and staining protocols. Most of the images I produced at that time were of cells I had grown in the lab and then sacrificed or structurally damaged either by improper use of equipment and/or preservation techniques required to fix cells for imaging. It became clear to me that the materials and living cells used and the process enacted to generate images directly impact the metabolism of the specimens. The imaging processes literally interfere with cell division and cell structure. The technological mediation of a cell's metabolism by imaging devices and the remediation of its image through media substantially change the lifespan and

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[4] I conducted an 11-month residency at SymbioticA as part of my doctoral field research for the research-creation project. Through engaging in performance research, I created *Living Viral Tattoos*, a multi-module set of artistic outcomes including video and biological sculptures, informed by tissue culture practice and various artistic "sketches" created in the studios of the Perth Institute of Contemporary Art.

liveness of the cell itself. The process of remediation also impacts the liveliness of the image and its lifespan in the cultural milieux of the laboratory, the art gallery, popular culture, and the knowledge economy, but with different thresholds and means of encounter. The notion of remediation: that is the repurposing or refashioning of media, coined by media theorists Jay Bolter and Richard Grusin (1999) is useful here. The concept, as applied in this context suggests that biomedia must be considered as interacting with various forms of visual media, and thereby its modes of representing life take on another perspective linked across the fields of art and science.

III. WHY ART AND SCIENCE?

It is through my discovery of the key role that remediation of cells and various imaging devices plays in relation to the liveliness of the image that I developed the research-creation project originally titled *Moist Media Archives* and then later changed to *Living Viral Tattoos*. This multi-modular interdisciplinary project is manifested through media that explore representations and practices of imaging life via biotechnology. Tissue engineering protocols and various artistic media are key to the project. Specifically, I worked "hands-on" in the laboratory with the practice of transplanting and staining viral cells onto human and pig explant tissue to create visual patterns in the shape of bruises. The making of these biological sculptures is represented via a short video documentary (included in the appendix) situating myself as a reflexive and ambivalent agent of marking bodies through scientific and artistic processes. A series of artistic "sketches" featuring a performance, installations and video projection were developed at the Perth Institute of Contemporary Art in tandem with the biological art sculptures created at SymbioticA (more in Chapter 2). The exhibition, or rather

the cancellation of the exhibition of the biological sculptures at the Ormeau Baths Gallery in Northern Ireland, is reflected upon as exemplary of the confusion that can occur when reading scientific and artistic representations of biotechnological processes and materials (this is expanded in Chapter 4). A series of journal articles (included in the appendix) were written to further share and distribute the process, technical application of lab work, and theoretical preoccupations of the research-creation project. The writing resituates the project through a rethinking of research in relation to the remediation of languages, terminologies and cultures of visual literacy from both art and science.

The research-creation project engaged in a variety of imaging practices from both a scientific and artistic perspective. Three modes of visual production inform the work, including establishing an indexical relationship between subject and image via scientific instruments; exploring the performativity of the image document; and considering the image not as a representation of life but as life itself. By working with an awareness of these three modes of visuality across artistic and scientific methods, I propose that a fourth mode, bioremediality, offers a further reading of images that expands the literacy across artistic and scientific fields by bringing them together through a "mangling" of methods (expanded on in Chapter 2).

IV. INDEXICAL, REPRESENTATIVE AND PERFORMATIVE IMAGES

The first mode of image capture used in the project is the establishing of an indexical relationship between the image and the subject life to generate truth statements (Van Loon). This is a useful rule and constraint I employed

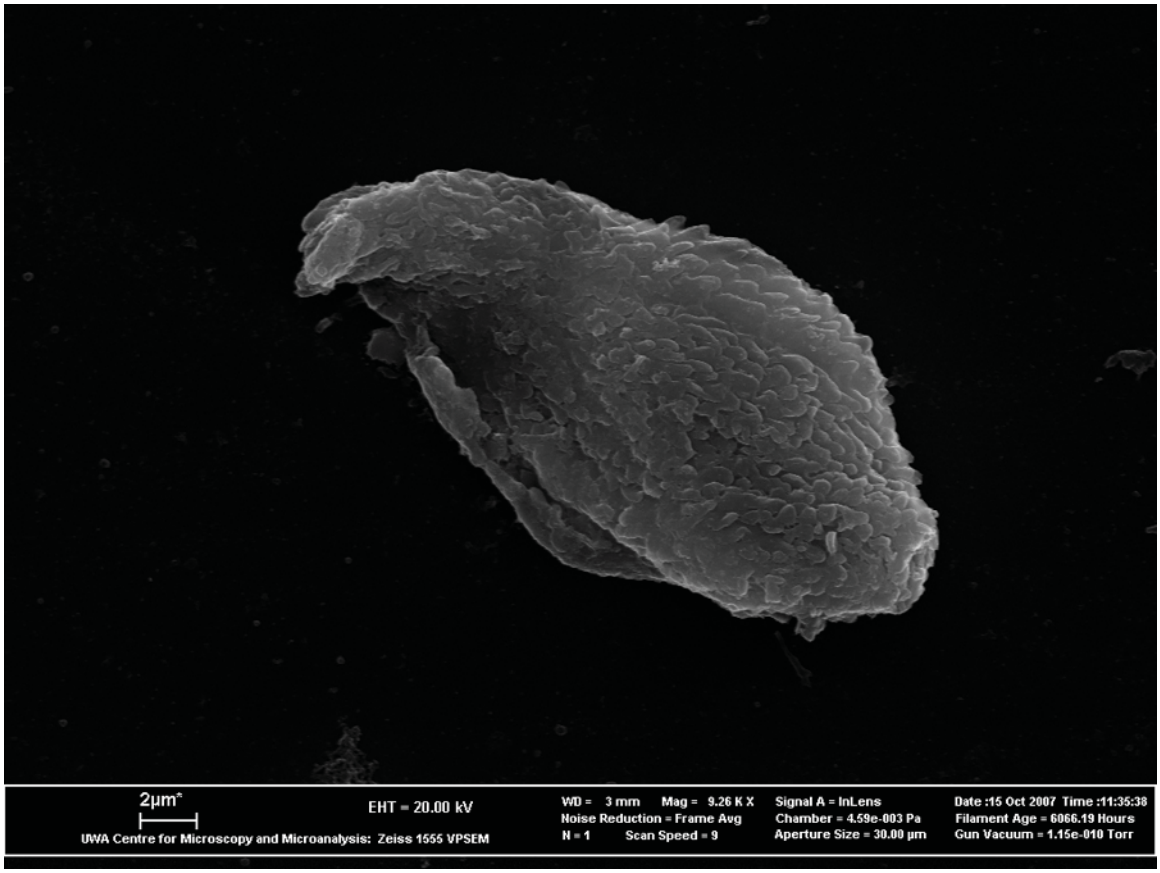

Fig. 2: Scanning Electron image of structural damage of Hacat cell
Photograph credit: Tagny Duff (2008)

during the imaging processes used to trace viral cells on the surface of skin for the *Living Viral Tattoos* sculptural work. The emergence of the colour blue on the cell surface of skin signaled the presence of viral cells via the reaction to antigen. This time-consuming method used to visualize liveness and metabolic reactions is a mainstay of science protocols, and determines a repeatable indexical relationship between visual image and chemical processes (see *How to Make Living Viral Tattoos* in the appendix for the scientific protocol that was developed for the project). This process, however, is also known to be variable

and as such the Western Blot method is used as a secondary process to confirm that there are no false positive results. From a media art point of view, I could have painted or photoshopped the same effect on the sculpture or image without having to go through the many months of work in the lab. But in this case, my intention was to both reveal and demystify the practice of imaging cells and truth claims of viral cell transduction through practice. The combination of both artistic and scientific imaging cultures and practices expands the potential of reading in the image, the materiality of the image, and the performance of its creation. For example, the title of the project *Living Viral Tattoos* troubles the truth claim achieved through visual representation of the preserved sculptures. When we see the image of the flesh, or the flesh sculptures themselves, they appear to be alive, yet as the tissue is fixed, the cells are no long scientifically alive.

Another mode of reading scientific images explored throughout is their performative dimension. The diagrams, scales and tables used to quantify observations of cells render a voice of authenticity. Bruno Latour outlines the various ways facts and images are performative and reflect the culture of the science laboratory, thereby challenging the very notion and practice of fact-finding (*Laboratory Life*). Like Latour, I am interested in the performative dimensions of laboratory image-making practices, and my own role as an agent in that construction. The public reaction to the image and biological sculptures *Living Viral Tattoos* reflects how scientific images and words are performative and suggest a liveliness. Images, like speeches, "do something". Following J. L. Austin's notion of performativity of speech, where an utterance is doing as much as saying something, images are active in their own right. The documentation images of the *Living Viral Tattoo*s are highly charged—perhaps more so than

the material sculptures themselves—because of the performative nature of the scientific framing of the image. The *Living Viral Tattoos* are performative on the levels of the image, the process of their making, and the texts generated through the making (including this text). As media studies scholar Philip Auslander notes, "The act of documenting an event as a performance is what constitutes it as such" (*Liveness* 5). Auslander further argues that liveness and live performance, as we understand it today, did not exist before live broadcast television emerged.

Following this line of thought, the third mode of image creation considers art theorist Boris Groys' reading of the potential for documents to be not only performative but also alive. Image documents, or other documents such as statistics, identification, etc. inscribe a lifespan. As such, Groys argues that documents are biopolitical. This is a useful frame to read and perceive images as non-human entities with unique forms of liveliness. Groys further argues that how one encounters the image brings it into being. Media theorist Joost van Loon follows a similar argument from a Science and Technology Studies (STS) perspective. He proposes the concept of "enpresenting" and suggests that scientific imaging devices like the microscope create both an indexical relation and signification of the image through presentation and representation of liveliness. The concerns that surfaced from the *Living Viral Tattoos* image document and the perceived risks of exhibiting the work in Northern Ireland speak directly to the ambiguous status of liveliness of both images and viral cells (as further explored in Chapter 4).

V. BIOREMEDIALE IMAGES

All three aforementioned modes of imaging inform the fourth mode I am proposing called bioremediality. By working with biotechnological imaging devices and processes as an embedded researcher in the culture of laboratory science, I am especially interested and concerned about exposing the process of how materials and devices used in the lab are used to image and sustain life. The "bioremediale image" is understood as having a life and a threshold of liveliness that may be read across various human knowledge sets and also exceed them.[5] Arguably, the reading and experience of the bioremediale image may be limited due to current divisions in art and science literacy across disciplines. This liveliness is explored through the lifespan of bioremediale images created as part of the *Living Viral Tattoos* project existing in various systems of perception and interpretation simultaneously, in this case the frames of media art and life sciences. The multi-dimensionality of bioremediale images is proposed here as a remediation of images, materials, human and non-human entities across artistic and scientific process. In this case, the materials, biosubjects, and matter used in the design of research devices, such as viral vectors, cell culture, plastic, chemicals, and metals embedded in the pipettes, flasks, and the imaging instruments themselves are key agents in the creation of images, but simultaneously may exceed the frame of representation.

To develop this notion of bioremediality further, I borrow from media theorists Jay Bolter and Richard Grusin's notion of remediation and art curator

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[5] This is not to be confused with Object-Oriented ontology, as the lifespan of the image, I suggest here is very much embedded in the process of relations of human perception.

Dmitry Bulatov's notion of biomediale works that traverse biological, analog and digital platforms situated within a post-biological era. All of these theorists suggest that media refashions and repurposes itself. My emphasis extends the reference of media to include biomedia and biotechnology. I address how the remediation of life—from a range of media and materials including matter, cellular metabolisms and organisms, chemistry, digital networks of distribution and dissemination in the *Living Viral Tattoos* project—across geological time and duration must be taken into account when generating and encountering the image. I argue that the making of the image in all its material thingnesss, liveliness and processual relations must be addressed in order for a "reading" of

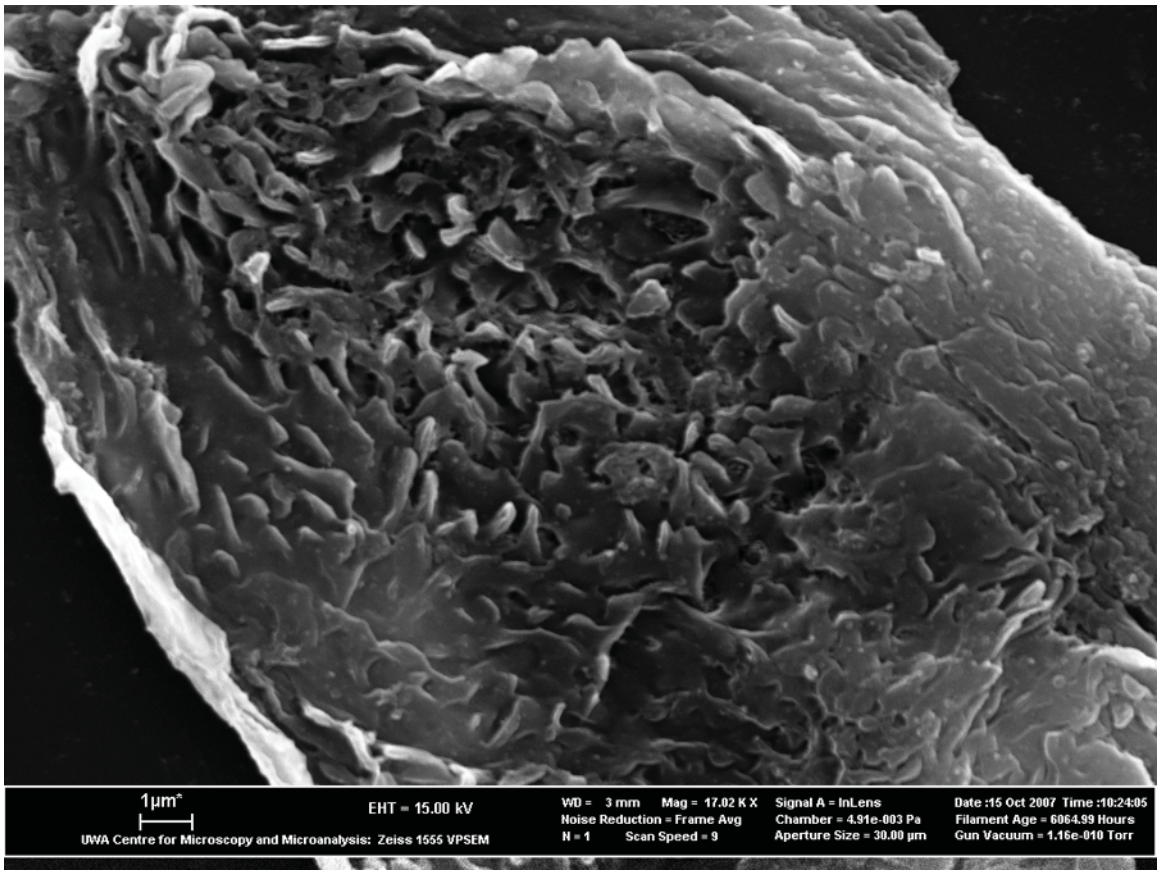

Fig. 3: Scanning Electron image of structural damage of Hacat cell
Photograph credit: Tagny Duff (2008)

the image to occur. Violence and the generative potential of image-making and liveliness is explored through the making of the *Living Viral Tattoos* across an ethico-aesthetic lens implicating science and art practitioners as well as non-specialists (see Chapter 3).

The temporal-spatial threshold of the project continues in various ways, and as such the durational quality and liveliness of images are particularly important. The bioremediale image does not stop once the work has been made, exhibited or conserved. An ecosophy (the notion that all practices are active in an ecology that is at once environmental, philosophical and social/psychic), as proposed by philosopher Felix Guattari,[6] is required to address the ecological and social-political dimensions in relation to aesthetic framings of life. How far are we willing to expand the frame of imaging devices and modes of visual reception when considering the mediation of liveness and liveliness? Might the remediation of media, particularly that of biomedia and the bioremediale image, be considered via their performance and materiality as situated in a broader ecological visioning of life?

I propose that these four modes of imaging life must be better identified through interdisciplinary research practices to address fundamental issues of visioning and perceiving life through processes of image representation. This written text does not set out to solve the problem, but rather, to identify some of the key issues encountered via the project. Some ideas are suggested for reframing how to reconsider and perceive the liveliness of images given the development of biomedia and tissue culture engineering practices today.

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[6] Guattari explores this notion in *The Three Ecologies*.

Pragmatically, this research points to the fact that artists and scientists have much to gain by sharing their different knowledge sets in this area to improve levels of art and scientific literacy. To promote this convergence of concerns around imaging practices in the media arts and life sciences, I aim to address the different sets of practices through the concept of bioremediality as a bridge across the two cultures (Snow). These modes of engagement are further explored in the following chapters.

VI. CHAPTER SUMMARIES

In Chapter 1 I outline the concepts of bioremediality and the bioremediale image as they inform the *Living Viral Tattoos* research-creation project. To do so, I flush out a review of key concepts proposed by artists and theorists that inform my understanding and use of the bioremediale image. Specifically, I explore previous propositions offered by a range of scholars across the disciplines of art and science with a focus on the performance and capture of life, including Peggy Phelan, Boris Groys, Lynn Margulis, and others. The distinction between liveness and liveliness and the desire to mediate life via the image is explored. Remediation of life and biomedia by various imaging processes in the life sciences and media arts is reconsidered as "bioremediale".

Chapter 2 outlines the methodological concerns relating to the research-creation project and the written text. The engagement with performance research as a process borrowed from performance art is explored as a vehicle for cross-pollinating methodologies and techniques from art and laboratory science. The performativity of the image is here reconsidered. The scientific,

artistic and humanities-based research practice is explored through the notion of the mangle, as foregrounded in the writings of STS scholar Andrew Pickering.

Chapter 3 explores how the imaging and creation of the *Living Viral Tattoos* exposes the constraints of the visual representation of zoe[7] and bios life. The creation of the bruise visualized on the *Living Viral Tattoos* sculptures is explored as a necessary visualization of violence manifested in the realm of zoe and the viral. The Guattarian concept of ecosophy is foregrounded as a necessary political engagement to expose the forgotten zoe, in this instance mammalian cells and animals.

Chapter 4 explores how our contemporary global risk society (Beck, van Loon) may preempt risk around the materiality, circulation and public display of biomedia and biomediale images. The cancellation of the scheduled exhibition of the *Living Viral Tattoos* sculptures at the Ormeau Baths Gallery in Belfast, Northern Ireland (2009), as part of the International Symposium of Electronic Art, is explored as an example of such tendencies of risk culture. The bioremediale image, in this case, the photographs, exhibition diagrams and the title of the work "*Living Viral Tattoos*" generates a liveliness across biological and digital materialities beyond the temporal-spatial frame of the laboratory and the public art gallery. The *Living Viral Tattoos* project exemplifies problems of communicating (bio)media literacy across the art-sci contexts of the public art gallery, the institutionally supported art exhibition, and the science laboratory. Here, bioremediality is proposed as necessary to considering the reading of images and liveliness across media art and life sciences.

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[7] I refer to zoe as the concept of life outside of the political or the good life, following Agamben's notion of bare life (explored further in Chapter 3).

The Conclusion suggests that a reconsideration of unnatural participations between the human and non-human from the molecular to the molar is necessary in an era where non-humans are becoming biosubjects (Gerlach et al.). I leave off questioning the modes of production around the bioremediale image in relation to bioremediation and suggest more focus be applied to the ecological impact and design of materials and processes afforded to such modes of image creation.

To address the aforementioned concerns through and from the *Living Viral Tattoos* research-creation project it is necessary to speak across the practice, culture and language of media art and life sciences. This written text is multifaceted, displaying a range of voices and experiences activated through my engagement with the process of this project as an artist, researcher, scholar, and teacher. My voice modulates in tone, rhythm and speed in the following chapters. Speaking across cultures requires different dialects, formalities and terminologies. When strung together a mangle of voices emerges.

CHAPTER ONE

The bioremediale image: liveness and liveliness

> The PC2 lab is empty this evening and no-one is around working in the sterile laminar hoods except myself and Maria, a neurobiology researcher and PhD candidate. We have just arrived from the hospital where I picked up a container with human breast tissue that was removed from a patient who donated it after undergoing elective breast reduction surgery. I prepare the petri dishes, pipette tips and other necessary materials for the transplantation of viral host cells onto human skin tissue. Maria watches and waits with the video camera.[8] (Duff 2008)

> TEXT SCORE #20
> Visitors lie down on the laboratory floor and look up. On the ceiling is a video image. From this perspective we see the bottom of a Petri dish. (As if we are on the hood and under the petri dish.) A hand administers a coloured stain over the layer of skin that we see. We become the skin that is transfected and fixed with the stain.[9] (Duff 2007)

[8] From the journal of Tagny Duff
[9] From a series of text scores written while working in the laboratory at SymbioticA.

I. TERMS AND CONCEPTS

The bioremediale image generates life and has its own lifespan. Such images may be epitexts, paratexts, diagrams, photographs, live biological specimens, videos, film extending across digital, biological and analog platforms. These images convey and occupy a threshold of life and living matter that is represented as finite and with absolute value, but are, paradoxically, in excess of such value. As outlined in the introduction, the bioremediale image can be seen through four modes of encounter. To flush out how the four modes inform bioremediale images, an account of terms and references related to the project and concept of bioremediality is in order.

This term as I am situating it expands on the term biomediation and biomediality, used by art and cultural studies theorists such as Dmitry Bulatov,[10] Jens Hauser,[11] and Kim Sawchuk[12] to connote biological media and the increasing importance of biomedia (such as cell culture, genomics, and wetware). Art curator Bulatov proposes biomediale works are operating in a post-biological era, as they traverse biological, analog and digital platforms. Hauser, a media theorist and art curator, calls for a deeper understanding of how bioart has an important role to play in reflecting on the biomediation of life. Sawchuk has written on the biomediation of bodies via the anatomy drawing and the advent of photography, which shifted representations and presentations of

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[10] As explored in Bulatov's book *Biomediale*.

[11] When discussing the term biomediation with Hauser, he proposed I read the paper he wrote "Sculpted by the Milieu- Frogs as media", based on the work with mutant frogs by artist Brandon Ballengée, as an example of biomediation.

[12] Sawchuk uses the term in a conference paper "Biomediation, incorporating photography: the case of Grant's 1943 Atlas of Anatomy".

the human body. The discourse around the role of biomediation in art and science from such theorists has helped articulate various ways that biological media inform technological and artistic concerns around life and its representation.

I am drawing inspiration from the aforementioned explorations and framings of *biomediation,* but expanding the term by inserting the "re" to inflect an association with "*remediation*"; a term referring to the refashioning or repurposing of media as developed by Jay Bolter and Richard Grusin. This is a particularly relevant concept as it speaks to how biomedia refashions liveliness and lifespan across biological and digital media. It also situates the notion of the bioremediality within media studies and media history perspectives. I am also borrowing from the concept and practice of *bioremediation*. In particular, I turn to the life sciences and consider the concept and field of bioremediation, where living organisms (such as viruses, bacteria, yeast, and fungi) are applied and considered towards the remediation of polluted ecologies such as landfill, oil spills in water, and devastated forest areas. By bringing the notions of ecology and environment, living microorganisms, media and remediation into the realm of the image and its representation, new ways of seeing the role of materials in the production and distribution of *bioremediale* images, such as the *Living Viral Tattoos*, are proposed. Materiality and media associated with imagery and representation are reconsidered as having relations across multiple distinct systems including the realms of science and art.

Bioremediale images like the *Living Viral Tattoos* coexist in multiple systems and it is necessary to experience them through multiple lenses. As

science philosopher Henri Bergson reminds us, one image has relations in at least two systems, questioning how relations are maintained. He asks:

> Now no philosophical doctrine denies that the same images can enter at the same time into two distinct systems, one belonging to *science*, wherein each image, related only to itself, possesses an absolute value; and the other, the world of *consciousness*, wherein all the images depend on a central image, our body, the variations of which they follow.... [W]hat are the relations which these two systems of images maintain with each other? (*Matter and Memory* 14)

Bergson reminds us in this quote that images move across fields and as such must be perceived as a multiplicity.

The *Living Viral Tattoos* project explores how images are read as representations in art and science, but following Bergson, exceed such readings. For example, the use, manipulation of, presentation and documentation of donated human and pig tissue is created via artistic and scientific modes of engagement, requiring the viewer to ask questions of both fields. This cross-disciplinary mode of engagement with images at the level of representation can quickly evoke confusion. A cloudiness of reading and signification of the image might occur at this juncture and one question that can surface is: Is it science or is it art? Should I read the image as an indexical relation to the biomedia presented is the image? Or should it be read as an evocation of the imperceptible threshold of life and death? This research asks: How might an image speak to both science and art by acknowledging the range

of representational, performative images and that which exceeds those readings? Most pressing, this research proposes that by developing a bioremediale perspective via the *Living Viral Tattoos* project, we can begin to ask how an image crossing through both art and science might open up a terrain for exploring the problematic of perceiving and representing life via the image—a question important to both fields. How is life rendered lively through bioremediality and bioremediale images as seen through a range of scientific and artistic perspectives, and why might such a notion be useful for practitioners today?

The concept of what I am calling bioremediality and the bioremediale image emerges from working directly with the imaging practices of molecular biology and tissue culture engineering as part of the *Living Viral Tattoos* project and various biological art projects I have engaged with since. My observation from working in the lab is that imaging practices that profess a one-to-one ratio of indexing observations of life with that of the image representation is not as clear as one might expect. Given the enormous shifts in the biotechnology arena, including the emergence of new digital technologies requiring specialized training, a lag emerges between the perception of life and the reading of image-based representations.

The lag in media literacy can be seen by the increase in retractions of scientific data and visualization documents in key scientific journals.[13] Many

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[13] The growing citizen science movement and the DIYbio movement can be seen as a testament to the desire of non-specialists to access the means to understand the scientific data and image set often reserved for laboratory science and the specialist.

images used to document scientific research have been recalled due to user error with newer digital imaging technology and also because of the deliberate manipulation of images to support claims. With the advent of faster imaging media and data storage used in biotech, and the increase in specialized skills and education, the misrepresentation of image documents as facts is more easily applied and, more alarmingly, used to forge data for publication in the sciences. For example, an article in *Nature* outlines how the misrepresentation of electron scanning microscopy images was used to support a peer-reviewed article about creating a "Nanoconstruction kit". The publication reported that, "The NCSU [North Carolina State University] investigation concluded that because the investigators had failed to index their data, a statement in their *Science* paper saying that 'a combination of scanning electron microscopy and electron diffraction showed that the hexagonal particles were crystalline palladium' was 'a falsification'" (Reich). This falsification is posited as a result of a misreading of the imaging device. Reich continues, saying, "The investigation added that Feldheim, who supervised this part of the work [the electron microscopy imaging process], was 'negligent' in having failed to consult with an electron microscopist, given that he and the student who gathered the data lacked the knowledge to index this themselves" (Reich). The misreading of image documents intended to index representations of life to biomedia (like cell culture) reflects the fragility of the indexical relationship between life and its representation by technoscience, and raises questions as to the reliability of both imaging devices and media literacy in sciences.

On the other hand, in various artistic fields the manipulation of images, intervention with the indexing of meaning and creation of errors has long been applied strategically to generate desired aesthetics. Forgery, hoax and

deliberate manipulation of media networks and distribution modes are often engaged in by artists to convey the fallibility of images as documents of authenticity and truth. Artists such as Eduardo Kacs, Laura Cinti[14] and many others working with issues around biotechnology are able to both identify and design convincing scientific and artistic hoaxes and interventions that present fictional or erroneous scientific information because of their training in image and media manipulation. The aesthetic use and strategic presentation of images beyond factual representations is not usually applied in research sciences, although there has been a noted increased in forgeries of data and image sets that are retracted.

The aforementioned concerns illustrate a pressing need for artists and scientists to work together to reexamine the power of the image, particularly how it informs our knowledge and taxonomy of life on the planet. Certainly, images are not the only mode of representation of life on the planet. Performance and relational art practitioners, for example, have been critical of the reliance on imaging and particularly image documentation practices that seek to represent live events and life itself (Phelan). The penetrating gaze of the observer through the eye of the microscope continues to be a major mode of knowledge construction, despite concerns around the commodification and objectification

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[14] Here I am making reference to an art project created by UK artist Laura Cinti that professed to a new science discovery that manipulated the growth of human hair on a cactus. Eduaro Kacs' project Alba Bunny suggested that he was creating a glowing green bunny for art, when in fact such practices are frequently done for science research practices. The media generated around the "non-event" of Alba being released from the laboratory was carefully crafted by Kacs and speaks to the issues around the lack of public scientific and media literacy.

of life by feminist scientists like Donna Haraway, Evelyn Fox Keller, and as noted in the introduction, scientists like Martinovich and others working in the Strangeways Laboratories at the turn of the 20th century.

In order to situate how the *Living Viral Tattoos* project exemplifies the bioremediale image it necessary to cover some of the literature and conceptual premises around the capture and dissemination of life through images. I first explore how life has been rendered through image documents as representation in performance and scientific practices. Then I explore how artists and theorists such as Peggy Phelan resist the "capture" of life through the technoimage by foregrounding the importance of human presence, experience and liveness in

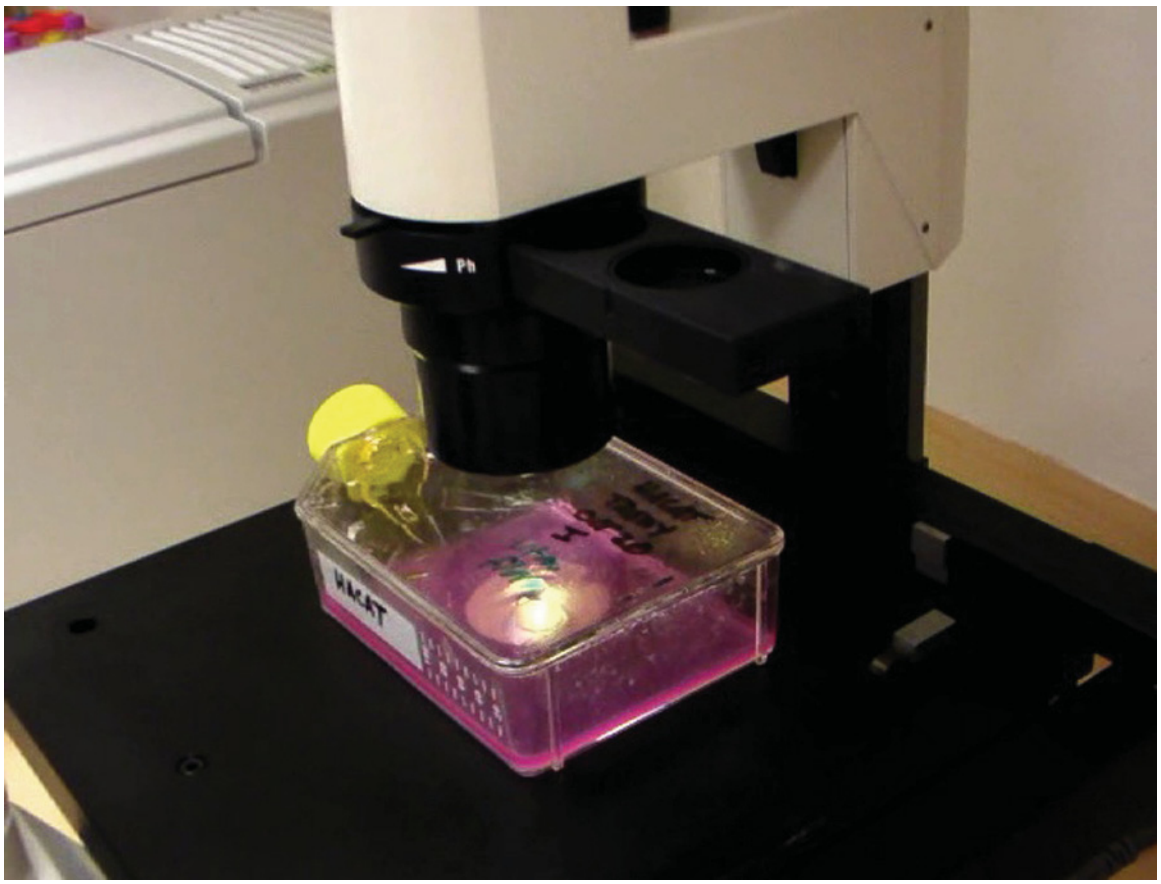

Fig. 4: Inverted microscope used to image cell culture
Photograph credit: Tagny Duff (2008)

the mid to late 20th century. I suggest that the notion of liveness and performativity of the image document later outlined by Philip Auslander challenges Phelan's focus on the ontology of performance and live presence, and displaces the focus to a technological determinist stance.[15] Both positions reiterate an anthropocentric bias focused on "bios"; that is, human-centred life. Finally, I suggest we consider bioremediale images as lively and with a liveliness that must be considered within the non-human and a threshold that exceeds the human/animal dichotomy of zoe and bios through a consideration of Brian Massumi's notion of bare activity.

II. LIVENESS AND LIVELINESS

First of all, what of this term liveness? Before we can contemplate the bioremediale image as it appears in the *Living Viral Tattoos* project, some sorting of terms is required. Liveness, simply put, is what we perceive to be alive. Often liveness presupposes a metabolic system. The presupposition of a metabolic cellular system as the foundational ground for life automatically renders non-metabolic matter as non-life forms. This assumption is evident in the taxonomy of life via the Tree of Life and domain models that categorize cellular organisms on the planet. The categorization of life is constantly under negotiation as science "discovers" and reconsiders the boundaries and relations across cellular life. Bacteria, for example, are now included in the three domains of life (Bacteria, Archaea, Eukaryota) and it is scientifically accepted that they traverse all living cellular life forms through a horizontal gene transfer. This challenges the representation of the human as belonging to a static taxonomy,

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[15] Auslander argues that before broadcast television there was no "live" performance. The assertion that television and broadcast technology was the precursor to liveness privileges the narrative of technological progress.

including the Domain of Eukaryota and the Animal Kingdom on the current Tree of Life model representing evolution of life on the planet. The inclusion of bacteria in the domain of life suggests that there is no strict separation between what we think of as human-animal and bacteria and yeast. This calls for a reconsideration of how we humans perceive of ourselves, and a conscious unpacking of the habitual tendency to see life through anthropocentric lenses that privilege the human body as the most complex cellular life form. The assumption of cellular metabolism as the determining factor of life may also be in need of reconsideration (Groys; Massumi; Parisi).

As in biology, performance studies has tended to frame the human body as the primary living actant, subject and recipient of live performance. As I will explore in the following paragraphs, Peggy Phelan's influential view on the ontology of the body as being the primary and originary site of live presence and "life" echoes a similar sensibility to the scientific assumption of metabolic life as the means of being live and life. Phelan argues that the image cannot capture or represent liveness or the event, and that one must be there to experience the original event. This is in direct opposition to the scientific use and application of images that seek to represent, signify and index life. But, interestingly, both vantage points presuppose there is an originary life or presence found in metabolic bodies.

Images are used to represent and index what is observed and known of life and liveness in the life sciences. An image can be a fact based on a mechanistic and causal relation between image document and specimen. There is an understanding in the scientific community that new ways of seeing, visualizing and representing life must be reflected upon. Scientists Lynn

Margulis and Dorion Sagan suggest that science must embrace the variation of life and ideals of liveness between the mechanistic view that reduces life to its chemistry and vitalism that sees all matter as life. They ask, "But is there not something wrong with both the mechanization of life and the vitalization of matter?" (*What is Life?* 7). Margulis and Sagan argue that mechanistic science is deeply rooted in metaphysical and religious assumptions that presupposed a living creator and humanlike design. Both perspectives are imbued with an anthropocentric tendency that, similarly to the ontology proposed by Phelan, privilege the human subject and human point of view.

Another way of seeing is required to bypass the habitual modes of human perception of life. To circumnavigate this reliance on the human-centred view, Margulis and Sagan suggest that it is not enough to consider everything a life and live. They state that if everything were conceived as life based on the humancentric perspective and notion of a creator, then the complexities of the non-human, such as molecular elements, would not have been discovered. They state, "The animistic view of the cosmos as a huge organism is also flawed. It blurs the distinction among what is living, what is dead, and what have never been alive. If everything were alive, there would be no interest in—and scientists never would have discovered the replicative chemistry of—life" (*What is Life?* 8).

As Margulis and Sagan note, not everything is alive according to the definition of cellular life, and the taxonomy of life is a useful constraint. If everything had a cellular metabolism then it is correct to assume that there would be no push to understand how other systems co-habit the planet. Margulis and Sagan's argument suggests that there is a variance to how life (and death) is conceived and imaged within these two polls of "all" or "nothing".

Vitalism and the animistic view of life is not useful and yet, how might we untangle the habit of relying on the metabolic human and such views as the basis and model for defining life and liveness is embedded in the disciplines of art and science?

Liveliness is a term that that I apply here to challenge the habit (my own habitual modes of viewing are implicated here) of considering metabolic systems as life. I consider various forms of active non-human agency that do not have a cellular metabolism, such as the bioremediale images created via the *Living Viral Tattoos*. The term "liveliness" is generally understood to be synonymous with vibrancy, vitality and vigorousness. It may be "the quality or state of having abundant or intense activity" and "full or suggestive of life or vital energy; active" (Merriam-Webster Dictionary). It addresses a vibrancy in non-human matter and a rethinking of what and how one may consider alive. I am suggesting that the bioremediale image may be conceived as lively with a lifespan, and as such, it is a lively actant that must be considered within the biopolitical realm. Furthermore, I propose that notions of liveliness must expand across the arts and sciences so that the reading and literacy of the bioremediale image can be considered at a time in history when literacy of biotechnological imagery in art and science is arguably at a critical juncture (this is explored further in Chapter 4). Before I expand on how the *Living Viral Tattoos* exemplify liveliness, it is necessary to consider the term and concept "liveness" in live performance practices.

III. LIVE PERFORMANCE, PERFORMING LIVENESS

Revisiting debates around the notion of liveness in performance through a cultural and performance studies framework provides a useful way to resituate a relation between artistic and scientific notions of liveness and liveliness situated in current discourses of performance and media art practices. Interestingly, the assumptions and concerns around the representation of life and live presence in performance art echo many of the same issues found in laboratory imaging processes. The problem of capturing liveness via image documentation continues to be a concern in these fields and offers a fruitful place to contemplate the bioremediale image and the practice of imaging practices inside and outside laboratory science. Discourses around the performance document in the 1980s and 1990s explored many of the same issues around representations of life and liveness that are now surfacing again as artists and scientists capture life through contemporary biotechnological imaging devices.

In the 1980s and '90s in North America, experimental performance, performance art and intermedia artists and practitioners faced growing pressure to produce documentation of live work after decades of generating ephemeral type works that did not conform to the reproductive economy. Writing about performance at the time, Peggy Phelan notes that, “The pressures brought to bear on performance to succumb to the laws of the reproductive economy are enormous” (149). The pressure to produce documents was due in part to the emergence of a strong art market and the realization by a generation of artists that their resistance to commodification of the art object also prevented entry into the art canon, historical memory and archives of museums. At the same

juncture, the variety of media used in the reproductive economy was growing exponentially, particularly with the mainstream use of live broadcast television, and the emergence of digital cameras, Internet and the World Wide Web. Phelan's focus on the ontology of performance as having prior importance to its document can be seen as a strategic move to resist the over-commodification of art and the tyranny of technological reproduction in the age of what would soon become the super information highway and post-biological era (Bulatov).

The emergence of the digital copy and the internet brought with it an important shift in terms of how we have since come to perceive of bodies that traverse analog and digital media. Cultural theorist Bernadette Wegenstein, argues that the avant-garde provided the means for the body to become the focus of performance art in the early 20th century, but, heeding Phelan's concern, the body collapsed and became part of the frame with its environment: a modified ready-made by the mid twentieth century. Wegenstein concludes that performance moved away from traditional venues and physical locations to the digital online sphere by the '90s. She states that the performance audience was also displaced from a physically engaged and present body sharing a live moment with a performer, to that of the Internet downloader of video files. The moving video image and rapid distribution of digital images online became the experience of "liveness". As Wegenstein explains,

> This is why now in the era of the 1990s extensions, there is literally no 'room' for performances anymore. They have moved into cyberspace, into architecture, into computer generated narratives, and in these new installation [*sic*] we definitely need no longer worry anymore about the absence or limited presence of the

> audience. There is no audience in cyberspace, just different 'downloaders,' contributing and participating in the creation of a rhizomatic process of meaning." (224)

Wegenstein voices a concern circulating in the performance studies and cultural studies milieu at the time, when the status of live performance was destabilized by the emerging "super information highway". The habitual presentation of the human body performing in 3D analog space shifted and changed via digital images (text as image) distributed on the internet in new online platforms such as Multi Object and User Oriented games and sites (MOOs and MUDs), webcast streaming, viral videos, peer-to-peer file sharing distribution networks, etc. Digital images soon became and arguably continue to be seen as performing live "bodies".

As forms of media distribution grew and the digital copy became more ubiquitous and present in our everyday lives, the notion of live performance resisting its own documentation has become increasingly difficult and complex. The proliferation of digital copies and live broadcast on digital screens radically shifts the notion of live performance. The document of live performance (and hence the document of life) is no longer a representation of a live event but a performative event in and of itself. Media theorist Philip Auslander (2006) suggests that the art document is performative, and he situates the concept of liveness in performance as the result of a retroactive categorization made possible by recording and broadcast technologies (such as audio records and television). Auslander (1999) further submits that before broadcasting

technologies there was no live performance, there was *performance.*[16] This argument, while presenting a strong case for liveness undervalues the bodies and live events occurring outside of the technological gaze.

So far I have traced some key notions of liveness in performance and documentation practice and how these have shifted since the latter part of the 20th century. My intention in exploring the shift in notions around performance is to reflect on how the assumptions of live and liveness have contributed to the strong division between life and its representation through media and images in art. At this juncture the emergence of non-human liveliness presents itself, informed, I argue, by the increasing importance of biomedia and scientific notions of lifespan.

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[16] Oral tradition through storytelling, for example, may also be seen as a kind of recording technology reminding us of the fact that bodies are a form of documentation. *The Couple in the Cage* (1992) is exemplary in this discussion as it reflects confusions pertaining to live performance and human bodies *as* documentation. Guillermo Gómez-Peña and Coco Fusco exhibited themselves at art galleries caged as discovered “undiscovered AmerIndians” from an unknown imaginary island called Guatani, supposedly located in the Gulf of Mexico, accompanied by an elaborate and false ethnographic history. The artists became living human documents satirizing, with great irony, a long tradition of museum, gallery, and scientific ethnographic displays of living species. However, most of the audience perceived of the artists as "real" natives. Audiences could not distinguish between the performance (the ironic reenactment of such display practices) and the documentation (in this case the inscription devices used, including the costumed bodies of the artists, the cage and the site of museum). This added another layer of dynamic complexity to the performance.

IV. THE DIGITAL IMAGE DOCUMENT HAS A LIFESPAN

The digital image is no longer only a representation of bodies in performance. The digital image constitutes a body with a lifespan. Russian art theorist Boris Groys suggests this is in part due to the fact that the digital copy has replaced the original. That is why, he reasons, art documents—such as video clips, digital imagery, interactive computing, and text documents—have become so prominent in art museum. Art documents, similar to bureaucratic documents that inscribe a life, are in fact not documentation and representation of life, but life itself. Groys notes, "In this way, one is again confronted with the question of the relationship between art and life—and indeed in a completely new context, defined by the aspiration of today's art to become life itself, not merely to depict life or to offer it art products" (55). Groys argues that art documentation, including performance documentation, can be seen as life and as such it is "alive" in the scientific meaning of the word. The point he suggests is that it is no longer the discipline of science that preoccupies itself with life but the arts that have a critical role to play. He acknowledges that life at various scales (i.e. time, duration) cannot be indexed given the scope of human perception. The document becomes the necessary carrier of liveness. Groys posits that documentation (particularly in the form of images) produces life, as he articulates here: "And that is precisely the point at which the documentation becomes indispensable, producing the life of the living thing as such: the documentation inscribes the existence of an object in history, gives a lifespan to this existence, and gives the object life as such—independently of whether this object was 'originally' living or artificial" (57). This crucial point that Groys articulates is also one I echo in my own work *Living Viral Tattoos* outlined in upcoming chapters.

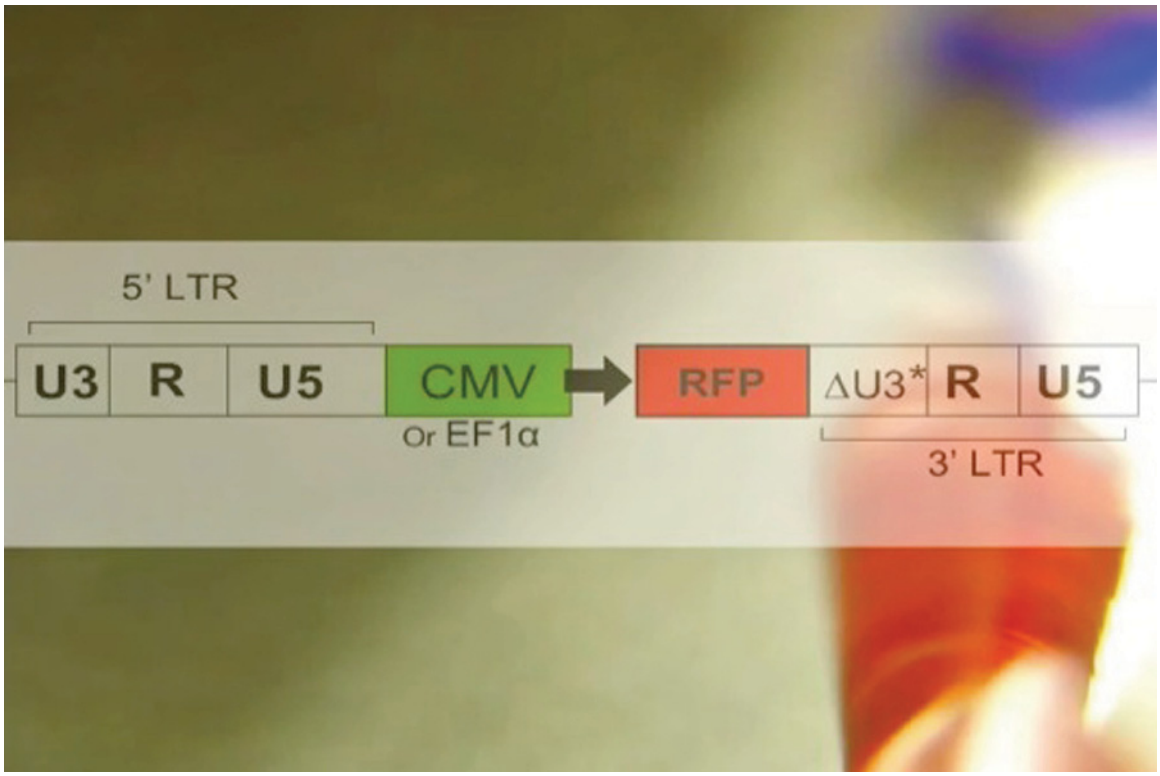

Fig. 5: DNA construct of Lentivirus
Image of Lentivirus with RFP used for project

I suggest that image documents are generative of a liveliness across both artistic and scientific imaging technologies. Furthermore the performance of liveliness generated by the image document brings with it a biopolitical dimension that requires consideration. Of particular interest here is how the (re)fashioning of life or more specifically the remediation of image documents generates thresholds of what I am framing as "liveliness".

It is at this point that the bioremediale image begins to appear. I turn our attention from performance and imaging of life and liveness via a cultural studies perspective to that of biomedia and imaging practices in tissue culture engineering and biotechnological laboratory practices today. The critique of imaging practices from performance studies in relation to the current

complexities of life (re) presented in the science laboratory through biomedia presents a provocative and productive shift in the understanding of synthetic/digital/biological metabolisms and the potential range of liveliness of the non-human.

V. CONSIDERING LIVELINESS IN BIOMEDIA

Image creation is a major function and output of biomedia today. Biomedia features the use, imaging of and engineering of lifeforms troubling the traditional models of imaging life situated as a living/dead, organic/artificial, digital/biological organism and body. Biomedia may be seen to generate documents that produce and accumulate vast amounts of biological and digital data. As Eugene Thacker notes,

> Put briefly, "biomedia" is an instance in which biological components and processes are technologically recontextualized in ways that may be biological or non-biological. Biomedia are novel configurations of biologies and technologies that take us beyond the familiar tropes of technology-as-tool or the human-machine interface. Likewise, biomedia describes an ambivalence that is not reducible to either technophilia (the rethoric of enabling technology) or technophobia (the ideologies of technological determinism). (*Biomedia* 6)

This framing of biomedia by Thacker challenges assumptions of liveness that are founded on the metabolic and cellular body. Such reframing of "the body" is productive for performance, media and life science studies as it

provokes a rethinking around bodies in relation to performance with and as new technologies and media. It is particularly useful to consider how biomedia may frame life and liveness beyond the anthropocentric and technologically deterministic gaze to consider non-human agency and lifespan. Thacker notes:

> The 'body' in biomedia is thus always understood in two ways—as a biological body, a biomolecular body, a species body, a patient body, and as a body that is 'compiled' through modes of visualization, modeling and data extraction, and *in silico* simulation. It is this interdisciplinary cross-pollination (biological computing, computational biology) that is characteristic of biomedia. (*Biomedia* 13)

The interdisciplinary nature of biomedia, as noted in the quote above, recalls the proposition made in the introduction that bioremediale images operate in multiple fields simultaneously. In this case, the body is not based on the assumption that life or liveliness is modeled on the human form or cellular metabolism. The focus on the non-human is a pronounced and generative aspect of the biomediale image as it opens up a more complex reading of life and liveliness. It can also, however, if one is not careful, generate perceptions of non-human at the expense of cellular metabolisms, materials and bodies. As Thacker warns, with the advent of biomedia, material bodies can be devalued, whereas the data taken from material (often cellular) is privileged. He notes: "There is, in biomedia, a general devaluation of material substrates (the materiality of the medium) as being constitutive of patterns of relationships (or essential data)" (*Biomedia* 28). This statement resonates with my experience working with biomaterials within a laboratory science context. When scaling of

materials occurs between the molar and molecular, the singular relation and complexity of each strata is often overlooked in the process of growing cell culture, for example. (This discussion in expanded with regard to the HeLa cell line in Chapter 4.)

The devaluation of materials towards the creation of data and knowledge sets is an important consideration that I explored while making various image documents as part of the *Living Viral Tattoos* project. For example, through my work with imaging devices such as the Scanning Electron Microscope (SEM), I learned how electrons blasted at the specimen's surface may damage or alter the cell by the "touch" of electrons bouncing off the cells' surface into the detector lens before the analog signal is converted to the digital image rendered on the screen. If the detector is left on too long, a burn mark will be made on the cells. In this instance, the longer one looks through the lens and gathers data, the more structural damage is done to the specimen. Sometimes this damage is marked on the image, and other times is not perceived through visual means, but is observable later on in different iterations of the experiment. The impact on the materials may also be imperceptible to us. The question I ask is, How can we humans fully grasp the destruction or life-giving results we may cause through the act of looking via the aid of bioimaging devices? To address this question, a moving away from anthropomorphic visions of life, while still reflecting on our own vulnerable human bodies as well as those of non-human entities and materials is required. As Thacker reminds us: "We are used to thinking of affect and phenomenological experience generally in anthropomorphic terms... Are there zones of affect specific to the molecular domain and irreducible to 'molar' aggregations or anthropomorphisms?" (31).

Cultural studies scholar Monika Bakke notes that there are zones of affect that are impacted and exceeded by human observation and the "bios" in biomedia. As Philosopher, Brian Massumi, reminds us, zones of affect are neither of the human body nor human aggregations. If affect is not of the body or human-ness, but may create effects felt by the human-animal, then the question to pursue is how does affect move through the non-human? How might this imperceptible landscape be felt by the human senses as filtered through visualization devices?

Bakke situates a zone of affect in bios's other, "zoe". She cites Paul Rabinow, noting that the term zoe, as implied via its Greek use, "referred to the simple fact of being alive and applied to all living beings per se" (22). Bakke contrasts this with Hannah Arendt's description of bios, which "indicated the appropriate form given to a way of life of an individual or group" (22). In her essay, Bakke calls for a recognition of both bios and zoe when contemplating the current biotechnologies and their implications for life. She notes the hierarchy of bios has been privileged as the formation of humans' concept of life, stating; "In the humanities, it has mainly been bios—human life—which has been considered worthy of philosophical attention, while zoe as its animal other remained marginalized" (22).

I appreciate Bakke's concern for expanding the range and zones of affect and life beyond the realm of the political and categorized strata of human-centredness that can be seen to forget it is animal. But there is a danger to this framing. Shifting the emphasis from bios to zoe may contribute to the binary separation, if one is not careful.

The categorization of life into dualistic schemas enforced by opposing dialectics of animal and human is problematic as it may repeat the very same impulses of biopower enacted throughout history. In "A Cyborg Manifesto" Haraway challenges the key dualism operating in the Western paradigm since Aristotle. She notes "... dialectics too is a dream language, longing to resolve contradiction. Perhaps, ironically, we can learn from our fusions with animals and machines how not to be Man, the embodiment of Western logos" (173). By considering zoe as the forgotten Other of bios, there is the danger of perpetuating a similar dialectic Haraway notes—one based on exclusion and inclusion of the human and animal. Would this not be an exercise in enacting a model of biopower that turns zoe into bios?

Sidestepping the logic of exclusion/inclusion implicit in the dynamics of zoe and bios, Massumi proposes the idea of "bare activity". Bare activity is, "The unliveable, impelling life potential (actively including that of death)" (170). Brian Massumi posits this as an alternative to the logic of dialectics seen in the framing of zoe and bios proposed by Agamben. The concept of "bare life", according to Agamben, presents the idea that nature (zoe) is excluded from culture and politics (bios). Massumi argues that this framing of the terms evokes an animal vs. human dichotomy. The idea of "bare activity" is situated as a dynamic state that traverses the life-death threshold. This threshold is proposed as a phase-space where uncertainty and potentiality emerge in far-from-equilibrium thermodynamics. Massumi's articulation of bare activity is most useful for situating the fourth mode of encountering the bioremediale image. I explore how the interplay between zoe and bios perform not as a dialectic but as phases of uncertainty operating in a dynamic state more akin to bare activity. (I discuss this more in the Chapter Three and Four.)

The following sections explore the background to the term "remediation" as a form of transcoding and mediation. I propose that (bio)remediation is a catalyst for bare activity and contributes to a complex threshold of refashioning and generating life and liveliness as seen in the *Living Viral Tattoos* project.

VI. REMEDIATION

To better situate the bioremediale image, a further consideration of remediation as a key form of generating life and liveliness is required. Bolter and Grusin's seminal work *Remediation: Understanding New Media* resonates with the manner in which biomedia transforms—or as I suggest— is remediated today. Their proposition is that remediation is a processual relation where media repurposes and refashions itself. The term "remediation", as they frame it, suggests that media are always in flux, hybrid, never originary and have agency within human culture and the reality of the human material world (19).

It is not coincidental that Thacker notes the importance of remediation and references Bolter and Grusin's definition in the first few pages of his book *Biomedia*. To understand how biomedia evokes life, the remediation of various imaging technologies such as film, video and computational art as producing a threshold of liveliness across bodies is required. Thacker suggests the body, too, may be remediated as a cultural artifact and notes:

> If Bolter and Grusin discuss all media as remediations, we can modulate this statement to suggest that the body is a remediation, a process in which a functioning, biological materiality self-manifests, caught in the midst of the poles of immediacy and

> hypermediacy, the 'body itself' and the body enframed by sets of discourses (social, political, scientific). (10-11)

The body, in this case, is remediated as media, along with various other forms of media. Thacker notes that, "media are indistinguishable from the biological body" (13). This focus on "the body" as media suggests a multiplicity and as such may be better positioned as "bodies". Such bodies as media exceed their signifying chain and inscription. I situate this excess in relation to non-human life beyond the frame of the computational model, whereas Thacker posits it in relation with a form of transcoding, noting,

> For Bolter and Grusin, a level of transcoding is implied in the very act of remediating; that an earlier medium such as print or film can be remediated in a digital medium such as the Web implies a level of transcoding such that both a print object and a film object can be re-presented in a digital medium such as the Web. (9)

Thacker concludes that if it is possible to remediate digital new media, is it possible to transcode and remediate the human body. For Thacker, biomedia may work according to an informatic protocol following an encoding, recoding and decoding format. This is somewhat reminiscent of Bolter and Grusin's notion of remediation across new media—where the process of transcoding media from film to video, analog to digital, real to virtual is a non-linear and cross-platform process.

The problem of transcoding as mediation is that it remains within the paradigm of computer programming and recursive scaling models. Life is more

than binary digits and code. There are limitations to embracing the "coding" metaphors now commonly applied as "cut, paste and copy" across the life sciences and computer science as it gives the impression that all life and thought is available to be engineered (Willet, Catts and Zurr 2003).

The topic of DNA and genetics as analogous to the code of life (i.e. genohype) continues to be the dominating frame of discussion when it comes to the engineering of lifeforms; however, many artists working in the area of biological art are critical of this focus. Artists Oron Catts and Ionat Zurr are concerned about the misinformation that genetic manipulation is synonymous with tissue engineering and may be erroneously used to label a variety of scientific and artistic practices.[17] Artist Paul Vanouse suggests that the current notion of DNA as the code of life overlooks the material processes and modes of signification via technoscientific instruments that attempt to complexify metaphoric associations.[18] Furthermore, Jennifer Willet notes that the use of metaphors from the computation sciences such as cut, paste and delete are not adequate for considering the complex ecologies of agents and forces in operation within and outside of the wet laboratory. Philosophy of science scholar Evelyn Fox Keller explains that the use of the metaphor of genes and DNA as a program of life is problematic as it may be used in a reductive sense, thereby

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[17] I discuss this further in Chapter 3.

[18] Referring to one of his own artworks, Vanouse notes on his website http://www.paulvanouse.com/or.html "*Ocular Revision* attempts to nudge DNA imaging back toward the realm of biology. The goal (at least at present) is to force DNA to be read as substance rather than mere code and thus hopefully break a certain deadlock in Genetics caused by its overly simplistic operationalization."

bypassing the complexity of life.[19] Donna Haraway explains, "The organism has been translated into the problems of genetic coding and read-out" (164). The "bios" in biomedia is prominent and zoe remains on the sidelines, as DNA code, or genohype, has become prevalent in both fields. Margulis and Sagan remind us, "Understanding how DNA works may be the greatest scientific breakthrough in history. Nonetheless, neither DNA nor any other kind of molecule can, by itself, explain life" (*Microcosmos* 8).

The critique of remediation as a type of "transcoding" is based on a metaphorical foundation reliant on human technology and media—particularly computational sciences. But it arguably omits the other sciences and modes of engaging in bodies— from tissue culture/microbiology and environmental sciences. Bioremediality, provides a conceptual platform for exploring the

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[19] Keller notes that genes do not act all the time and they require agents to be activated. Nevertheless, genes obtained the status of subjects capable of activating, regulating and controlling gene regulation through the discovery of DNA. Keller cites cybernetic theory, and particularly Norbert Wiener's focus on purpose, as influencing the notion of gene action. Goal oriented behaviour became the focus of cyberneticists like Norbert Wiener and Julian Bigelow, who research self-guiding anti-aircraft devices used in wartime. Wiener's books *Cybernetics* (1948) and *The Human Use of Human Beings* (1950) were well-received and popularized cybernetics. Self-organizing systems (second order cybernetics) and complexity theory gained cachet at this time. The analogy between machines and organisms was common, particularly concepts such as program, information, message, feedback, purpose and self-organization. (Keller 145) Figures of speech create referential uncertainty and ambiguity in the concept of the genetic program. Keller suggests that this lapse is generative, in the sense that it was productive of research in the new field of molecular biology. It filled in the explanatory gap, allowing for development in the field.

relations between technology and life, beyond the representation and metaphor of life as code, or a simplistic rendering of code as life.

VII. REMEDIATING THE CUT

Life is not code but it can traverse both analog and digital ecologies. Cultural theorists Joanna Zylinska and Sarah Kember propose an alternative to the bioinformatic focus of media. Like Thacker, they revisit Bolter and Grusin's framing of remediation, and determine that while they appreciate how media may be seen to repurpose functionality of previous "old" media into "new" media, they see limitations to such a view. They suggest that the idea of remediation is

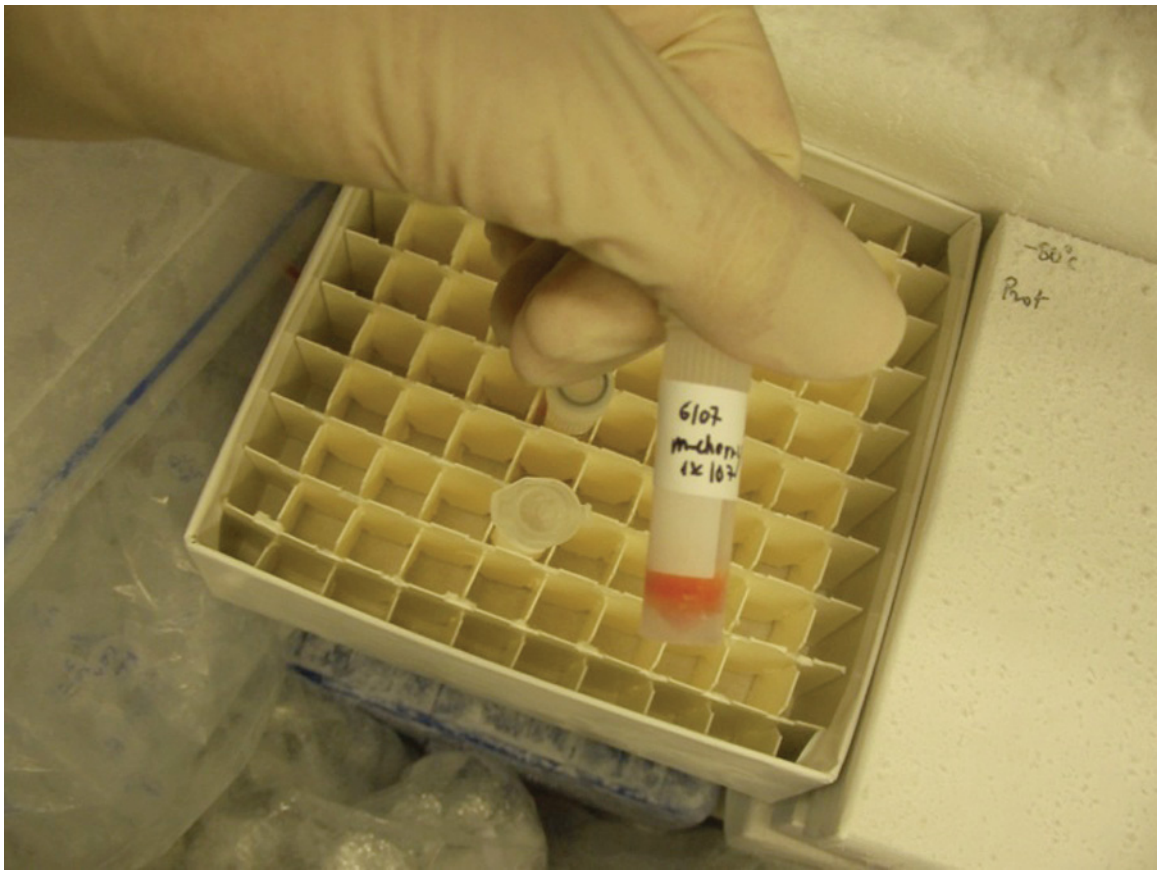

Fig. 6: Image of frozen Lentivirus used for project
Photograph credit: Tagny Duff (2008)

not to focus on the inevitable progress of technology, but, instead, to establish a complex topology of time and history that embraces non-linear trajectories of media as it traverses the analog and digital.

How can we humans, with our limited perceptual tools, reflect on the remediation of life, particularly through images that represent life in ways that are difficult to read across both the fields of art and science? Kember and Zylinska propose that mediation must be highlighted as a process in remediation and that interventions via the cut are necessary. "The cut" as they propose, comes from the analog world—reminding us that the cut and paste model embraced in the digital borrowed its term from the slow, hard and weighty world of paper and glue and its relation to the digital strata. It also reminds us of the impact of remediation at various scales of life: the molar, the molecular and the cellular. There is the regeneration of the cut; the violence and creativity embedded in the impact of the cut; and the manipulation and engineering required to make the cut. I appreciate Zylinska and Kember's call to illuminate mediation, and in this case remediation, via a cut or insertion to create a point of view or intervention in the flow of technological progress. This impulse to make "the cut", being the production and editing of an image and life, follows artistic traditions of collage, pastiche, remix, mashup, montage, film and photographic editing techniques, not to mention the cut used in performance and rituals with bodies, skin and blood. The cut also suggests repetition with a difference, such as the ritual of cutting that may be enacted in the same way with varying affects.

But isn't there something more than human mediation in the act and process of "cutting"? Something else is exceeding the capture and shaping of

the image. Making images involves making a cut to remediate a lifespan. My intention and attempt to mediate the image via the cut might generate the desired effect. I can represent the cut. I can acknowledge the performance of the cut. The cut may be impacted by the performativity of gestures and those of the participants and viewers. But it will also move in a way that exceeds the mediation of life by me or any other human-animal. The affective force of the non-human must be considered further. All four of these modes inform making, experiencing and reading the *Living Viral Tattoos* as "bioremediale images".

Fig. 7: Image of explant tissue used for project
Photograph credits: Tagny Duff and Maria Grade Godinho (2008)

VIII. CONCLUSION

The application of biomedia in the life sciences and now in artistic practices must be addressed as part of the growing discourse on liveliness and its representation through images, particularly in performance studies, media arts, and life sciences. I am suggesting, along with many other artist-researchers in the field,[20] that by engaging with the science imaging techniques in the laboratory directly, rather than observing scientists or engaging in secondary reports and literature, artists, humanities scholars, and social scientists may be better equipped to research questions related to liveliness and life by engaging with biomedia via material practice. Scientists, too, may practice artistic protocols and ways of "cutting" by creating image documents in situ of the laboratory. As media theorist Nicole C. Karafyllis observes, "When artists use laboratory techniques and imagery, they problematize not only the borders between *in vivo* and *in vitro* but above all the third conceptual method of biological science as well: *in situ*" (44).

Artists and scientists and the non-specialists can engage with the bioremediale image by becoming aware of four modes of encountering liveliness: that is, how 1) the indexical relation represents life; 2) representation presents life; 3) performativity implicates life; and, 4) the non-human exceeds the human-animal (and our visualization devices). Such a mode of engagement

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[20] Oron Catts and Ionat Zurr have maintained this stance since starting their work with tissue culture in 1997. Other bioartists also support this perspective in their own writings, education workshops and laboratory projects including Adam Zaretsky, Anna Dumitriu, Jennifer Willet, The C-Lab, Andy Gracie and Hackteria among many others. The DIYbio movement developed by scientists and citizen scientists has a large role to play here too.

with images would open the way for both artists and scientists to ask: How is the experience of liveliness and creation of image documents part of the metabolic and non-metabolic continuum of life and liveliness? In the case of the *Living Viral Tattoos*, one could ask, How do the materials and lifeforms explored in the lab continue to generate affects and the effects that are felt in its various forms of representation? We might consider how imperceptible life continues to thrive but exceeds image representation. For example, chemical compounds, animal and human cells, plastics, and metals applied in the making of the *Living Viral Tattoos* continue to be remediated in landfill, becoming an ecosystem for bacteria. The plastic pipettes used to feed the cells have long since been autoclaved, moved to the incineration centre, burned and released into the atmosphere as a CO_2 emission.

In order to consider the non-human in biomedia, an expanded perception of ecology across disciplinary divides is required. This concern is addressed in the following chapter that explores the mangle of methodologies required to generate the bioremediale images created as part of the *Living Viral Tattoos.* Let us walk into the laboratory and examine the bioremediale image in situ.

CHAPTER TWO:

Performing the Mangle: process and performance research

TEXT SCORE #7

Take 10,000 plastic pipette tips,10,000 flasks with a human cell line and red nutrition solution. Place pipette tips and flasks point side up, on the floor of a PC2 laboratory. Make a red carpet of immortalized human cells and plastic. (Duff 2007)

TEXT SCORE #6

In a large empty room. Bright sunlight pours through the windows. A pile of human performers lie on the floor with dead mice. Someone comes in with a pail full of blue dye. Dumps it over the bodies. The water stains the floor dark blue. Someone comes in with a pail full of bleach and mops the stain. (Duff 2007)

TEXT SCORE #3, CONTAMINATION

Human ethics forms, NLRD etc. forms, HaCat cells, acidophilus pills, medium. Scissors, safety pin. (Duff 2007)

TEXT SCORE #11

Performer spends one month writing forms to conduct experiment noting in detail how contamination will be prevented. On the 31st day, performer invites audience to the lab. Taking safety pin, inject

acidophilus spill. Spill contents into flask of defrosted HaCat cells. Cut up forms into small squares. Sprinkle into flask. Put into incubator. (Duff 2007)

TEXT SCORE #2
A long narrow table situated in the middle of the room holds a series of snowflake jars. In the jars there is a miniature scene of plastic animals and odd curiosities. When the jar is shaken or turned upside down by visitors, the incinerated remains of laboratory animals fall onto the plastic animals. (Duff 2007)

I. METHODS

Imagine the events outlined in the text scores above as occurring in a science laboratory setting. The voice, sounds, body movements, colour: all sensorial processes performing the antithesis of what is expected in the location. The experiential dimension of protocols and methodologies required within the space are configured, reconfigured into twisted knots. The rule sets are applied and then folded into and unto themselves with other rules sets.

To speak of the range of methodologies and rule sets applied from across science and art towards the making of the *Living Viral Tattoos* generates a strange voice. My voices shift pitch, speed and mode of articulation as I engage with techniques and rule sets from various disciplinary and methodological habits being learned and unlearned. The grounding of research constantly shifts as one set of rules is remediated to the next. I stutter and trip between the culture and practices of the science laboratory and artistic creation.

This mangling process both embeds and extracts different voices, movements and struggles through tissue "culture". A set of knots expand and contract across the meshing of interdisciplinary culture; the straining of a voice speaking, the spasm of a muscle while pipetting, the ripping out of a page from a laboratory note book, and the proliferation of contamination in cells flasks.

Performance research, a process-based practice, is a major aspect of the multi-modular research-creation project *Living Viral Tattoos*. The process of performance research foregrounds the performance of liveness and liveliness of human and non-humans (including my own). Working directly with the techniques of tissue culture engineering, cell culture and molecular biology provokes a consideration of the agency and materiality of microscopic and imperceptible organisms in relation with human bodies. It generates a shift in attention to liveliness on previously unexplored scales of performance through the lenses of performance and performance studies. Performance art, particularly body art, continues to privilege the human body as subject and object within discussions of liveness and liveliness as I have outlined in the previous chapter. What of the liveliness of invisible and imperceptible bodies and embodiment that currently defy our taxonomic categories of life? By engaging in a performance research practice, I perform techniques and develop complex visceral relations with microscopic and imperceptible entities that perform material agency, and in doing so, my role and agency as the performing human subject/object is deeply troubled. Answers are not sought out to correct the matter. Rather, the tensions evoked by the process are employed as pressure points and knots created with and through the process of engagement.

The remediation (and mangling) of methods occurs when I am embedded within the science laboratory as an artist practicing tissue culture engineering techniques and various art contexts including the gallery, epitexts and digital media. This type of remediation via a mangling of techniques may expand the threshold of liveness and liveliness, as it opens up novel and unexpected modes of perceiving life. This form of mangling also stands to refashion rule sets and culture of various art genres and disciplines as it does scientific practices. Mangling shifts the focus of human performer and human scale to the non-human.

Performance research, as I have engaged with it within the site of the laboratory, enacts similar methodologies and rule sets as laboratory science, but with a different trajectory. The performance research practice I engage in throughout the project is a type of mangling of methodologies from laboratory science, artistic production and scholarly research. The "mangle", as philosopher of science and sociologist Andrew Pickering has coined it, is a reinvigoration that synthesizes practices (particularly the sciences and sociology via the field of cultural studies) through a process of resistance and accommodation. Later, I expand on this notion of the mangle to include the textured, visceral and knotty entanglement of a variety of methodologies—from tissue culture engineering techniques to performance research—that appear to embrace, veer away from and at times even reject methodological habits. I suggest that this mangling can be seen as a productive process of remediation of various imaging techniques, methods and protocols across fine arts and science. In this case, various techniques and methods found in performance art, video, installation, display culture and tissue culture engineering are

remediated—mangled in a visceral, torn and messy reconfiguration of disciplinary and methodological expectations.

Methodology as I am referring to it implies a set of procedures, techniques, rules or modalities that inform various knowledge sets. While methodologies are usually considered as discipline specific, one can make the case that such modes and processes are influenced by many methodological approaches outside one's field. For example, tissue culture engineering practices are relegated to the discipline of science. However, this categorical framing is not fixed. Nobel prize recipient and scientist Alexis Carrel, for example, is known for his use of needlepoint to practice tissue culture pipetting technique, and his laboratory protocol followed many of the same techniques used in theatre production.

One requires methodology—that is, technique and rule sets—to generate process and to mangle.[21] A process emerges and enfolds onto itself. It cannot emerge without some kind of entanglement with the modes of situational rule sets. Remediation of methodologies is key to enabling the mangle, particularly for generating novel processes across various disciplinary modes of knowledge. To remediate and entangle laboratory science with fine art requires an embedding of techniques and rule sets in unexpected and novel ways. The way one is embedded within and embeds practices and techniques in a milieu is in constant flux.

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[21] This also recognizes anti-method as a methodological rule set seeking to break with its affiliated discipline.

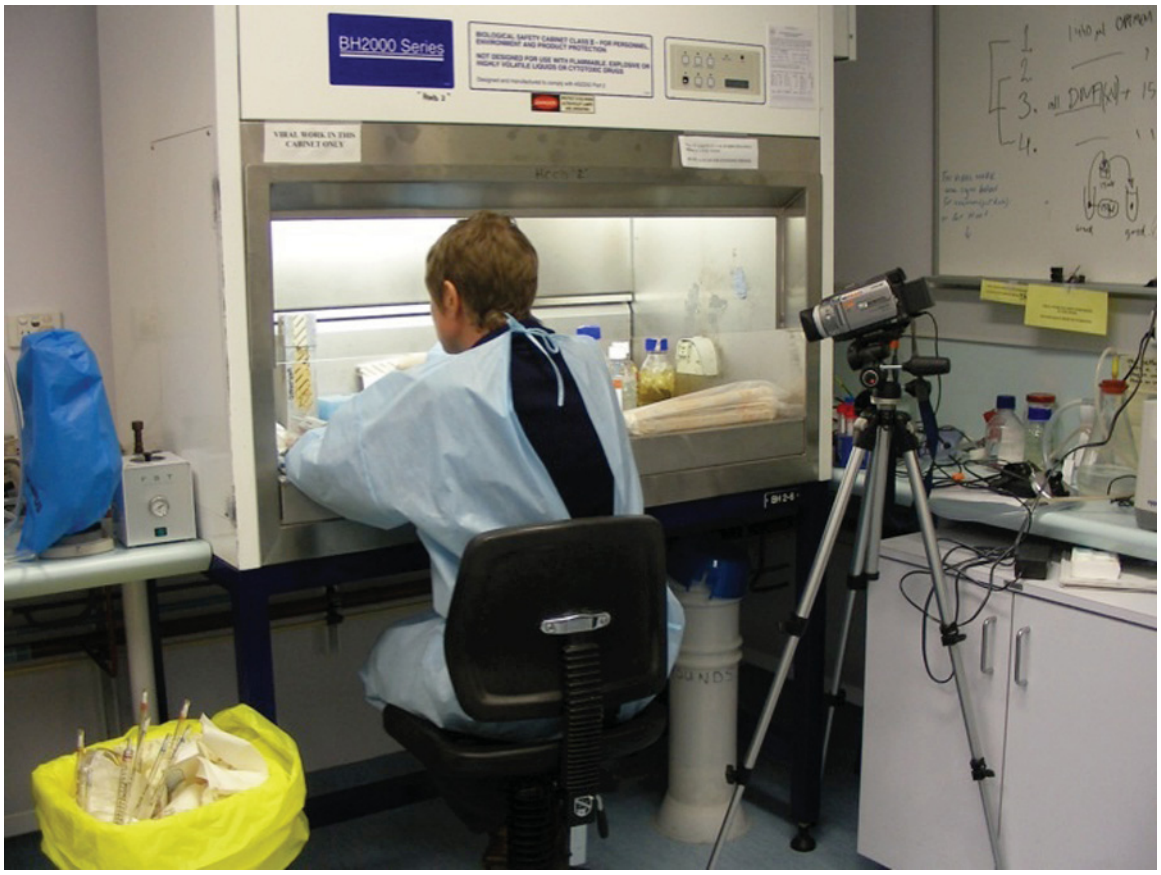

Fig. 8: In the laboratory at SymbioticA, located in the University of Western Australia.
Photograph credit: Joshua Schwebel (2008)

Process based practice is necessary for generating the mangle required for remediation of materialities. In this sense, process via the mangle is akin to a bioremediale practice that engages in the remediation of biomedia. Remediation, as a mode of refashioning media requires a catalyst. In this case, processual modes of thinking and making allow for engagement with media.

The following chapter explores various aspects of process based research, or performance research, entangled in the mangle of methodologies used to generate bioremediale images for the *Living Viral Tattoos*.

II. PROCESS, PERFORMANCE RESEARCH AND THE METHODOLOGICAL MANGLE

Performance research is a practice and mode of asking questions and visualizing potential ways of seeing and experiencing the world through hands-on engagement in situ. It is about asking "what if?" and "how?". It is not about reinstating performance as an art genre, nor does it describe a fixed work of art as is often expected in the production of art and display practices. Performance art, and performance research, has been closely associated with process. Tanya Mars, a major contributor to early feminist artist-run centre culture (Gallery Powerhouse) in Canada suggests that the practice of performance is a method of thinking through visual images and ideas. Media theorist, Kim Sawchuk, writing on Tanya Mars' work over the last four decades, likens her method to "performance as research", something she notes as akin to that of a qualitative researcher, where "learning through doing" and "[p]erformance as a method of enquiry is not only about successful results, but about an ongoing process that leads to further questions" ("Performance (Art) as a Method of Inquiry" 16). As Sawchuk notes, process is a major element in methods of enquiry used by Mars.

In many ways performance artist and theorist Suzanne Lacy articulates a similar notion to Sawchuk and Mars' framing of process and performance research. Lacy explains: "Performance and conceptual art helped to isolate the *process* of art, sometimes even substituting process for object" (Lacy, 177). She notes a continuum of processes that performance-based artists engage in. She outlines a shift in focus from the privileging of the artists' subjective experience as process, found in works from the 1960s to the 1980s, to a more recent process of reporting. "In the role of reporter, the artist focuses not simply on the experience but on the recounting of the situation; that is, the artist gathers

information to make it available to others" (176). Lacy posits the most effective process is moving from reporting (of what happened, how things were done etc.) to a process of analysis incorporating skills usually associated with social scientists, cultural theorists and investigative journalists. Lacy's call for analysis is not to frame art as an object unto itself, but rather to amplify the social dynamics and affective qualities of aesthetic intervention. The methodological approaches associated with such research areas are increasingly applied in art-making practices today, particularly as more artists enter graduate level university programs and engage with methods of analysis found in the humanities. Such methods of analysis borrowed from the humanities may render the writing of an art project as an analytical report, a case study, or an objection of theory. The sense of "analysis" Lacy intends does not follow the same meaning. Rather, the textual property of ideas becomes yet another aesthetic element. Analysis, in this way, is not understood as a traditional methodology of practice intended to fix a creative work within a defined form, but rather to generate something else: something more in addition to and through the visual images created.

> "When an artist adopts the position of analyst, the visual appeal of imagery is often superseded by the textual properties of the work, thus challenging conventions of beauty. Their analysis may assume its aesthetic character from the coherence of the ideas or from their *relationship* to visual images rather than through the images themselves. In this way, art of analysis draws on the history of conceptual art during the sixties, when artists explored the dematerialization of art as object and its rematerialization in the world of ideas" (177).

The fourth mode of processual engagement Lacy outlines is towards activism, when artists effect change.

To implement these modes of engagement, particularly regarding how to change the way one thinks and makes through art, Lacy suggests that " Entirely new strategies must be learned: how to collaborate, how to develop multilayered and specific audiences, how to cross over with other disciplines, how to chose sites that resonate with public meaning, and how to clarify visual and process symbolism for people who are not educated in art" (178). Lacy's call resonates with how this research-creation project attempts to engage with performance research, a process-based mode of artistic enquiry, and the laboratory sciences. To create strategies of engagement across the disciplines of art and science and engage new audiences, the mangle of practice must be considered.

Performance art practices have contributed and continue to contribute much to the insertion of aesthetic intervention into the social sciences and humanities via works investigating urban planning, community development, aesthetic philosophy, human rights, etc. The fields of the Life Sciences, including molecular biology, genomics, biochemistry and cell biology are becoming another area that artists, particularly those interested in performance, are engaging with hands-on. Contemporary performance-based and biological art based artists are not only representing methods and practices occurring in the life sciences, we are working with the same techniques and methods applied in the science laboratory context. Likewise, this research-creation project takes the site of the laboratory and the various techniques and methods applied as its focus. As an artist-researcher I engage first hand with the

application of such methods and disciplinary perspectives, thereby participating in the mangle. The relation of performance research to biotechnology and the site of scientific technique and method introduces complexities that are not necessarily the same as Lacy outlines in her exploration of how art might engage with methods found in the social sciences and cultural studies. The mangle I engage with is through a mode of process that requires more unpacking.

To consider the singular complexities that may be found in performance research enacted at the site of the science laboratory, I reflect on the research conducted between 2007-2008 towards the *Living Viral Tattoos*, working in a biosafety level two tissue culture laboratory at SymbioticA at the University of Western Australia. I outline the research conducted through a retrospective point of view and then, in later sections, unpack the modes of process that emerged that evoke "the mangle". I explore this notion of the mangle as it applies to all aspects of this project including autobiographical insertions and various modulations of voice as I drift through past, present and future articulation. I do this while keeping in mind that, "The objectivity of the mangle … is prior to methodological objectivity and is always liable to subvert substantive articulations of the latter." (Pickering 201) In other words, my writings on the notion of process are entangled in modes of both artistic and scientific methods.

III. PERFORMANCE RESEARCH AS PROCESS: THE MAKING OF THE RESEARCH-CREATION PROJECT *LIVING VIRAL TATTOOS* AT SYMBIOTICA. 2007-2008

My induction into the science laboratory at SymbioticA[22] came at a time when I was at a crossroads in my practice as an artist and scholar. I found myself frustrated with the repetition and excessive production schedules of the performance art festival circuit and what seemed to me to be an overreliance on discourses of "the body" founded on anthropocentric tendencies where the human subject reigned supreme. Then there was the new media Web 2.0 hype, which tended towards techno-fetishism and a narcissistic fashioning of self. I was coming to terms with how I might articulate live art, liveness, and time through a non-humancentric perspective. I turned towards digital media and the computer algorithm as a potential medium for liveliness. The idea of a living digital cellular metabolism with the potential for producing viral contagion became a point of departure. At this same moment, I was teaching an interdisciplinary course on HIV/AIDS and came to realize that while I had a firm grounding in the artistic, social, political, and historical dimensions of "the virus" and "the viral", I knew nothing of the scientific dimensions. I realized that science, particularly biotechnology and experimental biomedical laboratory research, was an area of inquiry that was missing in all my research pursuits. When I was invited to submit a proposal to work with viral vectors and cell culture in the science laboratory at SymbioticA, I decided to pursue this line of research without realizing at the time how important the process of engaging with and

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[22] SymbioticA, The Centre for Excellence in Biological Arts is situated in the Department of Biology and Human Anatomy at the University of Western Australia. I was accepted as a visiting doctoral student under the supervision of Ionat Zurr. The doctoral field research residency was funded by the FRQSC and SSHRC.

performing the techniques and methodologies of laboratory science would become to my practice as an artist and researcher.[23]

I entered into the laboratory with a set of research questions focusing on expanding the concepts of autopoeisis and transduction in relation to cellular division and viral transfection. My assumption was that I would be trained to grow cell culture and that I would observe and/or work with scientists who handled the viral transduction in the laboratory. This was not the case, and I found myself trained to work with tissue culture and viral vector independently.[24] After 11 months of training I was fully competent in wet lab protocols including growing and preserving cells, transducting viral cells, and working with antibodies and immunohistochemical processes, and various imaging process to amplify viral cells both on the surface of various skin substrates (human and animal) and microcellularly via microscopy (including certified training on the inverted tissue culture microscope and the Scanning Electron Microscope).

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[23] I was introduced to the possibility of attending a residency the following year to learn how to grow HaCat cells and transduce them with custom made synthetic viral cells (Lentivirus—a derivative of HIV strain 1) during a trip to SymbioticA as a visiting guest and videographer for a project by Biotecknica and TC & A in 2006. It was during the residency a year later (11 months of my doctoral field research) that I realized my interest in digital viruses was misguided, and in fact, partaking in a genohype that I now understand to be not only misguided, but potentially dangerous within a larger biopolitical framework.

[24] Stuart Hodgetts, at the time a post-doc fellow in the Department of Biology, trained me to work with viral vectors and immunohistochemical staining processes on my own, stated up front that he had no interest in being my technician, and insisted that I learn to work with the vectors on my own once I was fully trained.

As I had no prior experience or knowledge of molecular biology or tissue culture engineering prior to my arrival at SymbioticA, I improvised, and developed a process for my research-creation project once I was embedded within the site of the laboratory and came to terms with the various scientific methodologies. I realized that many of the concerns and material experiments I wanted to engage in were not possible within the formal and institutional rules of the university laboratory. The text scores included in this chapter illuminate the culture of containment and sterility that was required in the everyday performance of laboratory work and also reflect some of my desires to reconfigure and resist that culture. I wrote these text scores while waiting for cells to trypsinize and incubate, as a way to pass the time and generate a productive means for thinking through the performance of scientific methodologies enacted in situ.

After researching various scientific methods and protocols for handling skin samples and cells,[25] I outlined a proposal to create a research-creation project *Living Viral Tattoos* (originally called *Moist Media Archives*). The proposal outlined the scientific and artistic methodologies I was to engage in to make sculptural prototypes with donated human explant skin and Lentivirus. The intention was to make sculptures and biological art works alongside video and photographic works that would eventually be exhibited in gallery contexts. I was explicit in the types of scientific techniques and materials I would apply in the research, but vague in terms of the material form and outcome. Through my mentors and colleagues at SymbioticA, I was introduced to a cosmetic surgeon

[25] Most research documents were shared through my colleagues at SymbioticA and the Human Biology Department, as well as documents online and through science journals.

who was interested in working with me to find a donor who might be willing to donate their elective surgery "waste" tissue for the project and future exhibitions. Approval from the University of Western Australia Ethics committee was received approximately two months after the application.[26]

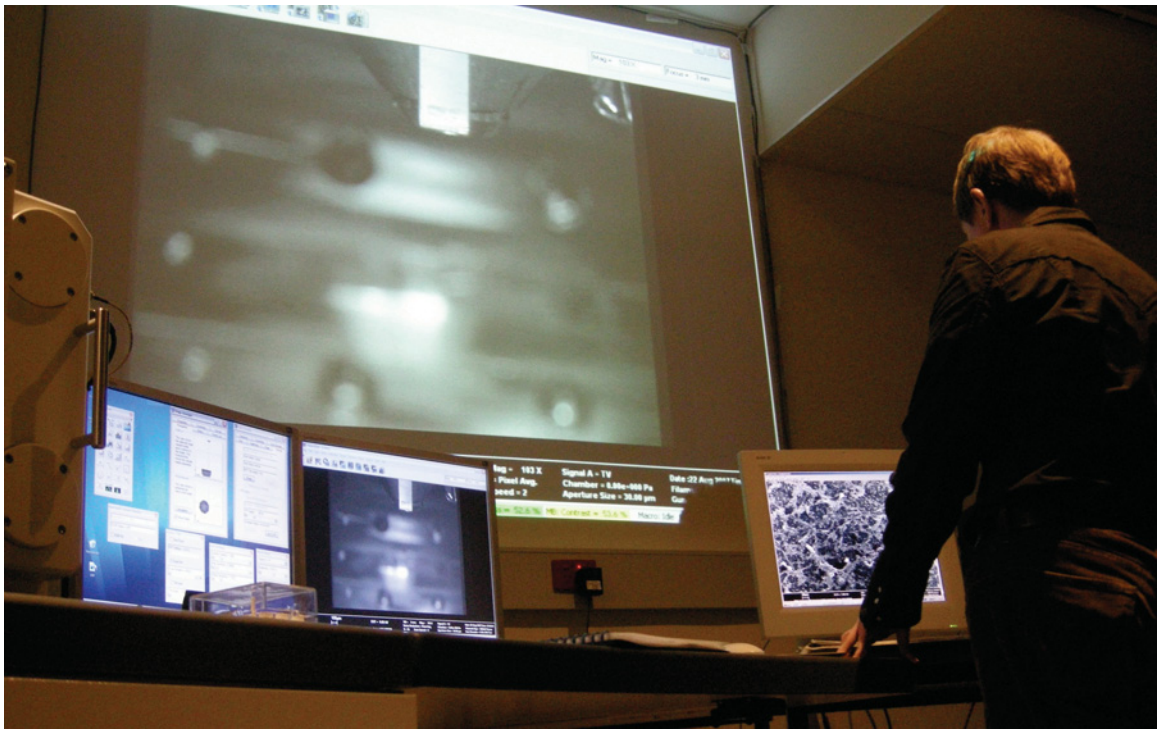

Fig. 9: In the Scanning Electron Microscopy lab at the University of Western Australia
Photograph credit: Joshua Schwebel (2008)

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[26] The ethics application underwent extensive review via Concordia University as the research proposed was unusual for a humanities humanities-based "beyond minimal risk" research project and I was asked to resubmit the application with additional letters from all parties involved. During the nine months of waiting for the approval from Concordia to create my research-creation project, I continued to conduct my training in the laboratory.

IV. MANGLING THE METHODS AND PROCESSES OF LAB AND STUDIO

In order to work with the documents created with and through my training in the science lab, I worked simultaneous in an art studio as part of an artist's residency hosted in the gallery at the Perth Institute for Contemporary Art (PICA).[27]

The research conducted in the studio provided a context for reflection on the concerns I was encountering with the work conducted with living and biohazardous materials in the science lab. A series of artistic works were created with the intention of introducing a live audience to image documentation generated in the wet lab. The focus was to turn documentation materials into vibrant visceral and lively encounters for a public audience. This allowed me to consider the premise of my dissertation and generate "living documents" as a way to think through the various thresholds of liveliness and liveness and the implication of the bioremediale image.

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[27] The title of the project was *Viral Assemblage* and the focus was to activate documentation generated in the science lab, and to simultaneously, begin the research process in both spaces. The project description, listed on the PICA website, http://www.pica.org.au/view/Tagny+Duff/771/ was as follows: "The work produced in this studio residency re-examines contemporary perceptions of viral contagion, and aims to explore the potential for symbiotic relations between virus and host. The documentation of viruses is further explored not as representation, evidence or historical index, but rather as a host that proliferates viral relations in the realm of the social. Visual and textual documents generated from research conducted with retroviruses in the science laboratory are used as material in-studio towards the construction of a series of artistic prototypes for a future interactive performance installation. The work created in-studio will produce a series of new viral assemblages and ecologies that visitors will be invited to interact with." (Website comments PICA)

A series of prototypes in the form of artworks/documents were created during my three month residency at PICA and exhibited in the gallery in 2008. Concerns and questions raised during the process of growing cells in the laboratory became the driving force for creating the work. Video clips, text, documents and residual materials accumulated through my lab work were remediated for four artistic works including *Tissue Culture Point of View* (video installation), *Contaminations* (installation), *Performing Diagnostics* (performance) and *Cryomemories* (interactive sculpture). These visual exploratory sketches reflect the mangling of methodologies that informed the creation of the sculptural prototypes, *Living Viral Tattoos* created in the wet lab.

One main concern that I explored through these visual prototypes was how the mangling of perceptual devices and the methods used to engage with the devices are enacted in laboratory science and art. The issue of perceptual encounter and observation of scale is a problem that scientific techniques seek to correct. Microscopy images are used by scientists to translate the cellular and molecular scale to the human scale and to create fact-based claims. Artistic engagements with microscopy utilize the same techniques but are used towards different means of perceptual claims and experiences. My process of working across both modes of engagement generated a fascinating mangle that I felt was best articulated through a visual, auditory and sensual experience. To activate this concern, I created the *Tissue Culture Point of View*, a site-specific video installation installed in situ of the PICA museum. The video is the accumulation of video shot in the sterile hood while feeding cells and is taken from the perspective of the petri dish looking up at the human hand that is feeding it nutrient solution via a pipette. While in the studio I researched a specific site for installing the work to suit the architecture of the gallery and the

proximity to the viewers' bodies. The intention was to bring the visceral encounter and experience of feeding cells to a range of publics who cannot access the laboratory or tissue culture engineering practices. It also explores the problem of the tissue culture point of view that assumes cell culture and the *in vitro* world is analogous to the human world as I outline in the introduction and through various iterations of this dissertation.

The culture of aseptic technique (the use of sterile equipment) and the prevention of contamination informed (and informs) all the processes I engage with in the science laboratory. The adherence to the aseptic technique is the fundamental rule of practice in the lab, and as such I followed it (and continue to follow it today). The mangle is particularly evident in between the aseptic technique (sterilizing all instruments and environment) of the laboratory and the aesthetic and practice of art making. I was trained in studio and performance art practices that revelled in visceral, messy and even dangerous and risky modes of inquiry. The aseptic technique requires a rigorous disciplining of the body: precision, repetition and cleanliness. Working in the studio at PICA provided me with a context to reflect on and explore modes of mangling aseptic technique with processes emerging from performance encounters, installation and sculptural works.

Contaminations, a site-specific installation, was another work I created to explore how perception and scale function in documenting and experiencing contamination through the practice of looking through the microscope. Text scores (many of the same scattered throughout this document) were printed on black vinyl in size 9 Cambria font and placed on the ceiling, cracks in the floor and walls of the studio. From the perspective of the gallery viewer, the text

looked like black mould, or the contamination one would see through the lens of a microscope. Gallery visitors were invited to climb on ladders to read the "contamination". Only the most daring who climbed the ladders became aware of the text scores and the unruly and at times unethical "documents" of laboratory events. The process of looking at and for contamination in cell culture through the microscope in the laboratory was remediated into the space of the public gallery through visual and performance techniques that allowed visitors to also engage in the problematics of perception and scale inherent in observation methods used in the science laboratory.

While working with the Western Blot method and antihistochemcial staining techniques in the laboratory I was fascinated by the emphasis on colour as a mode for collecting and generating data. My mentor and collaborator Stuart Hodgetts could see the "blue" of the antihistochemical staining process showing an antigen response to transfection, or the "red" of red fluorescent protein (RFP) through the fluorescence microscope when I could not. The science training scientists engage in to read and index images through the microscopic lens focuses on a different pattern recognition and meaning sets that those that an artist engages in. Through the practice of staining and microscopy I came to understand the complexity of perceptual interpretation of colour—something painting students well versed in colour theory are aware of. The combination of scientific and artistic processes amplifies the complexity of "reading" images through such devices. To further explore this problem I encountered in the lab of visual perception with interested public members, I developed the performance *Performing Diagnostics*. These performance events of groups of three to four, engaged participants in the practice of using the diagnostic tool ELISA (enzyme-linked immunosorbent assay), used to document and index the

Fig. 10: *Performing Diagnostics* (2008)
Photograph credit: Perth Institute of Art (PICA)

presence of HIV and breast cancer. In the performance, colours used to index pathogens were observed and noted for their unstable properties. Together, we performed the steps of a simulated diagnostic test for HIV while creating a collection of coloured charts to determine the diagnosis. The presence of human error and the difficulty of assessing the "diagnosis" through colour was emphasized. Thinking through and making the performance with a public audience raised many questions that assisted in further reflection on the laboratory research-creation. Specifically, the rendering of colour as a liminal marker for movement in, on and through cellular scale is further considered

through the creation and reception of the *Living Viral Tattoos* video and sculptures (as explored in the next chapter).

Within the laboratory, living biological matter is frequently conserved in stasis for future examination and research. Cryogenic preservation is a technique used to keep cell lines, tissues, and liquids suspended for periods of time that may exceed the lifespan of the bodies they were collected from. Art documents preserved as digital and analog media and are also collected and stored in temperature controlled storage environments often exceeding the life of the artist. Both processes of preserving alter the very structures they are seeking to contain, but with different results, and for different audiences. As noted in the Introduction, encountering the art document generates a liveliness. How the science specimen as a frozen document is encountered also generates liveliness. For example, the process of thawing and observing will affect the structural integrity and image quality of the specimen. Thinking about both processes of preserving situated through an artistic and scientific modality creates a mangle of perspective and sensibilities, not to mention potential.

One of the key elements of bioremediality is the fact that capturing life via the image or other documentation forms alters life itself. *Cryomemories* is a set of small image-based sculptures placed in dry ice that explores how human observation structurally alters what is observed and how it is observed. To engage audience members experientially, participants were invited to put on thermal insulated gloves in order to pick up small petri dishes stored in an open box of dry ice. Inside each dish was an image of cells (from my body, including snot and toe fuzz) taken with the SEM microscope, covered with temperature sensitive tissue culture glue. The longer the petri dish was held, the more the

glue melted and changed from white to transparent, revealing the image. This sculpture embodied the idea that preservation techniques in the sciences (like cryopreservation) are not neutral practices of documentation and that the human encounter impacts the liveness and liveliness of the specimen. The processes of tactile and visceral encounter of temperature and touch are foregrounded as key modes of knowledge creation and reception. The exhibition of these art documents and the process of engagement with them became a vital aspect of the performance research. I was able to activate public audiences and participants with the materials and ideas and discuss the process of my research in the lab.

Fig. 11: *Cryomemories* (2008)
Photograph credit: Joshua Schwebel

This attempt to briefly situate the sites of the laboratory at SymbioticA and the art studio/exhibition space at Perth Institute for Contemporary Art, and to provide an account of my research there is intended to provoke a deeper consideration of how the cross-pollination of methodologies generates the process for performance research across art and science—particularly tissue culture engineering and biotechnology.[28]

The following sections explore the specific implication of process as a messy and unpredictable mangle, calling for a reconsideration of the relation between process and methodology.

V. REWIND: PROCESS AS MANGLE

Earlier I mentioned Lacy's observation that process was substituted as object in early performance art and conceptual art works. In this case, process as I am applying it is not an object, but rather a mode and practice of thinking and making. Process is the key mode that I foreground in the performance research practice conducted in the science laboratory.[29] My insistence on process emphasizes the temporal-spatial dimensions of practice unfolding before signification or coding to frame process as method. As Brian Massumi notes, "The latter [coding and framing] are not false or unreal. They are truly,

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[28] Should a detailed description of the protocols and methodology used to make *Living Viral Tattoos* interest the reader, a technical paper providing a detailed description of the protocols and methodology used is included in the appendix. A DVD showing documentation from the making and exhibition of *Living Viral Tattoos* is also appended, offering another perspective.

[29] This sentiment is echoed by Andrew Pickering, who argues in *The Mangle of Practice* that the temporality of practice, particularly that of laboratory science, deserves more attention.

really stop-operations" (7). Process is a way of thinking through and with events and bodies before they become fixed into recognizable form. Process allows for variance, shifts in perspective, and emergence. It can be strategically used to redirect and reconfigure methodological habits. As Erin Manning notes "Process grows from discontinuity, emerging always in relation to how an occasion of experience has defined itself as such" (*Anti-method* 12). Process, as Manning reminds us, is situational and not a continuous linear trajectory where rule sets provide an exacting account of experience.

Process goes hand in hand with mangling. The mangle, a concept articulated by Andrew Pickering, highlights the necessity of engaging with "real-time structure", particularly the laboratory, to reflect on how the process of scientific research is impacted by resistance and accommodation to novel approaches to practice. He notes:

> "Practice as modelling, I thus realized, has an important real-time structure, with the contours of cultural extension being determined by the emergence in times of resistances, and by the success or failure of 'accommodations' to resistance" (xi).

He suggests that the practice of science is the temporal and spatial platform for the embedding and contestation of methods through resistance or accommodation of methods—indicative of cultural values. Furthermore, he suggests that, "This temporal structuring of practice as a dialectic of resistance and accommodation is, in the first instance, what I have come to call the mangle of practice" (xi). Here, Pickering notes the practice of laboratory science as a specific place and temporal plane where cultural tensions are articulated

through accommodation and resistance to various rule sets and modes of engagement.

My experience in the laboratory has shown that some scientific researchers are willing to accommodate artistic intervention in laboratory methods and protocols-while others are little more cautious or outright against it. The negotiations across the stakeholders in this context generate a mangling in forms of tensions and knots that occur in the temporal-spatial field of the science laboratory and art-research. Adapting methodologies and cultural modes of conduct in the laboratory with those of studio art and performance practice is a strategy of engagement and a major aspect of the processual unfolding of the research-creation project.

An example of mangling during my research at SymbioticA occurred between scientific wet lab techniques and methods and various modalities of techniques from studio art practices, including painting, sculpture, performance and media art. The culture of process and production in the laboratory was impacted by the techniques I introduced from the fine arts. For instance, I was unable to access viral vectors at SymbioticA due to the fact that only one graduate student was producing them for the research group, and I was told they would not be able to contribute the time towards preparing the Lentivirus. I turned to the practice of working with "readymades" and found industrial materials, often used in sculpture and installation-based art practices. I combed the Internet and found a sale on a custom designed Lentivirus made by a US-based biotech company. I ordered the viral vectors and they arrived by courier shortly thereafter. The viral vector, an industry-based technology, was reappropriated and repurposed as an art-based material (as well as biomedia)

for the sculptural works. This process of bypassing the laborious and time-consuming laboratory production of viral vectors created a disturbance in the culture of the research group. Engaging with the artistic technique of the readymade destabilized the order of production and the rules in place to conduct the temporal and spatial flow of research in the laboratory.

The mangle, such as the one just outlined, reminds us that methodology is not stable or fixed. Actions, events, and modalities emerge through process. Human and material agency introduces the unexpected, the unforeseen, thereby destabilizing methodological frameworks. Engaging with process can

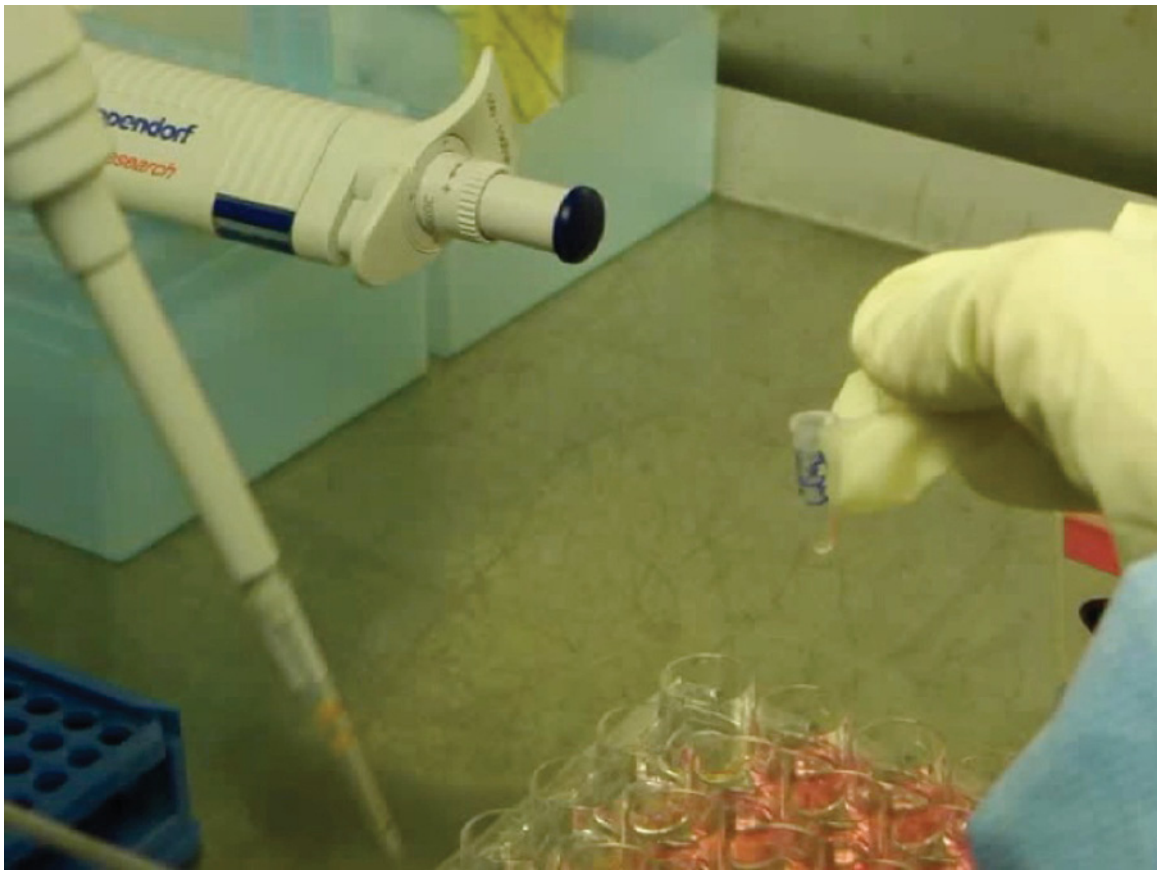

Fig. 12: In the lab pipetting lentivirus into the cells
Photograph credit: Stuart Hodgetts (2008)

generate and circumnavigate methodological habit. "Habit is an acquired automatic self-regulation. It resides in the flesh. Some say in matter. As acquired, it can be said to be 'cultural.' As automatic and material, it can pass for 'natural'" (11 Massumi, 2002). It is during moments when time is suspended, jarred, moulded, that the habitual mode of perceiving and relating in and with the world shifts. Changes in the perception of time may indicate a break in habit.

My approach to the research is to both borrow from and unlearn the habitual tendencies of methodologies applied in the laboratory and in art display practices. Rather than turn away from method, I both adopt and unlearn methods from both art and science. Learning the methodology of laboratory science amplified an awareness of my own habitual assumptions and practices when I engaged in "science", "art" and "academia". It is through performance research in the laboratory and through the enacting of protocols and habits that I came to discover the sets of rules embedded in techniques, methods and tools from multiple fields of knowledge, such as performance art, video art, molecular biology, environmental science, tissue culture engineering, cultural theory, and media studies.

VI. SOME THOUGHTS ON PERFORMANCE RESEARCH, MANGLING AND THE WRITING PROCESS

Performance research may utilize various media, but just as in scientific research practices, it is the written word and image documents that are often privileged as the end point and site of encounter through "official" modes like the dissertation, book, article etc. This is due to practical reasons—the word is often considered easier to mass produce, copy and distribute. The written word, just like copies of digital images that can circulate quickly and easily across digital

networks, is far easier to encounter than an exhibition event that occurs in a particular time and space. In contrast, biological media are slow and heavy, they have a liminal existence; plus they can be costly and difficult to access. This has often been the problem regarding performance and "live" events. It is also this quality that generates its value. With this in mind, my intention is to write reflexively and towards the future. The text scores that are featured in each subsection are exemplary of a desire to generate written documents that activate events across temporal fields. They can be "seen" as bioremediale images.

Similar to the concern expressed by scientists such as Martinovich in the early days of tissue culture practice (noted in Chapter 1), I too am concerned about how the production of my own research documents might be used to convey narratives that feed the mythology of laboratory practices and encounters with liveliness—whether that is through cellular life forms, the construction of microscopy images, or the performance of researchers. The text scores also point to the ambivalence I experienced at the crossroads between art and science research cultures. The texts propose routine science protocols and absurd performances to be enacted in the scientific laboratory (now, then and in the future) in order to question and insert a playfulness into the habitual performances associated with such a site.

In the following chapter, I continue to explore this dilemma of how we engage with the site of the laboratory and the bioremediale image via the mangle, and consider it as a kind of bruising. The bruise, in this case, is contemplated as both violent and regenerative. The visual image of the bruise functions as a call to viewers/audiences to consider and reflect on the darker

undercurrents of the framing of bios and zoe life in biotechnology and the manipulation of life. I explore the paradoxical states of violence and regeneration through a more detailed reflection of processes engaged with in the making the *Living Viral Tattoos*.

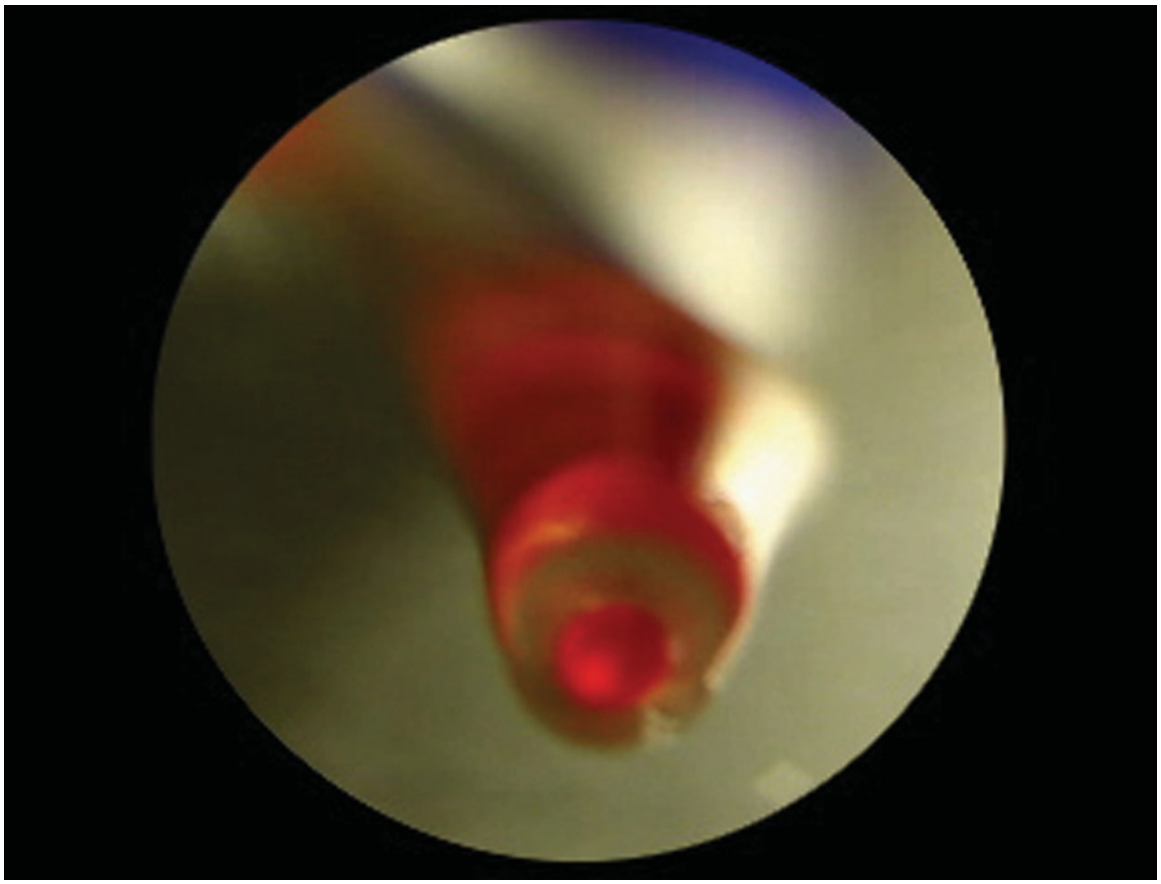

Fig. 13: *Tissue Culture Point of View* (2008)
Video Still: Tagny Duff

CHAPTER THREE:

Virality and violence in the science laboratory

Something is wrong with the video camera focus, Maria notes. So I stop what I am doing, replace the tissue in the container and we look through the viewfinder together to correct the focus. Then I continue to remove the tissue out from the container and place it in a Petri dish to clean it with PBS. Even with double gloves and forceps I can feel the softness of the skins surface. The cells in the skin are still alive and viable, even though they have been removed from the donor's body over an hour ago. I imagine the skin feeling warm. I know that the longer I wait to transplant the viral cells onto the skin, the less likely they will transfect the cells, and so I reach for the pipette. When I pipette the viral host cells over the skin, it flushes slightly red. I am slightly horrified and simultaneously fascinated. I imagine such an infection spreading in my own skin and through the video lens. (Duff 2008)

TEXT SCORE #14

Paper. A desk. A flamenco dancer with long pipette finger nails. Dancing on the laboratory bench. A guitar player sits off to the side. Each step making the sound of words…“ probability, rational, reasoning, experiment, end point, funding, meaning, future, progress, function…” The movements speed up with intensity, the words and images becoming indistinct from one another.
(Duff 2007)

I. IMAGING / IMAGINING LIFE IN THE LAB

The processes of growing and transplanting cells *in vitro* is no longer only the domain of science, but is now employed by artists with increasing frequency. Such processes and events employ performance and image documents that are mutually reliant on one another to evoke a complex threshold of liveliness. The texts above note my own ambivalence with the practices of manipulating and imaging life and liveliness. The relation placed between zoe life (life common to animals, humans and gods[30]) and bios (a signified form of life or living) are key to this concern.

The performance and documentation of viral cells and tissue culture in the *Living Viral Tattoos* project exemplifies how the visualization of life in art and science, particularly biological art, media and science culture must be reconsidered in light of zoe, our human relation to the imperceptible other and "bios", a political accounting of lifespans. The viral is explored as exemplary of the tensions generated in the movement between how humans categorize and politicize life (bios) and how life and liveliness is in excess of such taxonomies (zoe) within a dynamic field of bare activity. As noted in the introduction, bare activity is situated as a dynamic state that traverses the life-death threshold

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[30] Here I understand the word "god" to be a stand-in for imperceptible, non-human life, and haecceity and a life (as defined by Deleuze and Guattarri). I am referencing Agamden's exploration of the etymological root of the Greek terms in his book *Homo Sacer*. See Chapter 1 for more reference to Agamden's framing of the notion of zoe and bios. I place zoe and bios in relation to the "zone of indiscernibility", focusing on the potentiality as noted by Deleuze and Guattari in *A Thousand Plateaus*. This is a different framing than Agamben, who uses the term "zone of indistinction" to describe the intersection of zoe as the space/place outside of the language of politics.

where uncertainty and potentiality emerge (Massumi 1993). My intention here is to illuminate how the representation of relations between humans and non-humans perpetuate boundaries might be reconsider. It is not to connote an urgency to liberating other life forms and including them in the world of bios, but rather to reconsider how humans may shift perceptual habits of viewing life by addressing how liveliness is often represented within dichotomous and anthropocentric forms of categorization, as living/non-living. [31] I argue that coming to terms with the representations of zoe and bios is necessary to explore the potential liveliness emerging in the space of excess, or viral.

The Living Viral Tattoos project is the vehicle for a speculative and exploratory enquiry into the notion of virality as a space of excess through the applied use and representation of biological viruses. The process of growing, transplanting, fixing and staining viral cells on human-animal skin to create the image of bruises illuminates the problematics of bioremediality. The reading of such "bruises" may be perceived through systems of both art and science, as applied and symbolic forms. The use of retroviruses— in this case synthetic Lentivirus—and stains to create marks on skin implicitly evokes the research question: how can humans perceive of the imperceptible and the space of excess that the viral evokes? To contemplate this, the scientific and artistic processes of representation where zoe and bios emerge must be addressed.

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[31] Agamben echoes this sentiment observing that "modern democracy presents itself from the beginning as a vindication and liberation of *zoe,* and that it is constantly trying to transform its own bare life into a way of life and to find, so to speak, the *bios* of *zoe.* Hence, too, modern democracy's specific aporia: it wants to put freedom and happiness of men into play in the very place—'bare life'—that marked their subjection" (9-10).

The confrontation of zoe and bios is presented as an urgent one in a time when the status of life is rapidly under revision. This mode of confrontation is facilitated via the bioremediale images created via the process of creating the designs on skin. A form of violence erupts in the zone of indiscernibility and the political realm of bios. *The Living Viral Tattoos* project explores forms of violence via the transplantation of viral host cells on skin and the staining in the form of bruises to illuminate the symbolic, actual and the potential of current bioimaging techniques to manipulate, bruise and construct live events (and bodies). This creation process and the resulting stains embody ecosophy, acknowledging the violence implicit in the making and display of stained images on all four of the wet sculptures.

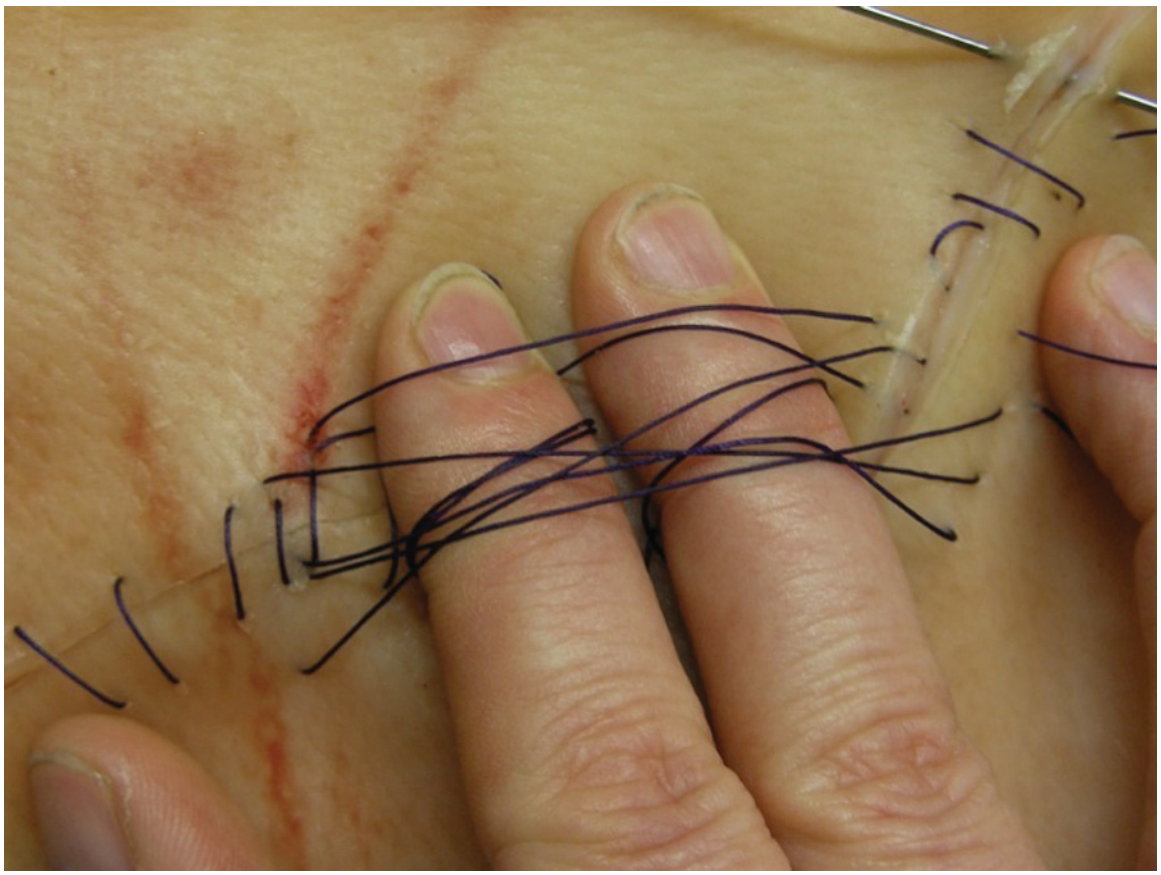

Fig. 14: *Sewing myself into a pig* (2009)
Photograph credit: Tagny Duff

II. THE VIRAL: MOVEMENT AND VIRTUALITY

The title *Living Viral Tattoos* conjures up an evocative image. It suggests both an impossible visual picture and one full of potential. At first, one may imagine visible ink designs on skin when thinking about tattoos. The idea of tattoos made from a virus and seen on the skin is difficult to apprehend. How can I see or speak of something I cannot perceive or discern, yet I know is there? It is not alive or a live presence I can name. But I feel it. My skin is tender and too warm. I smell metallic material and the lights seem brighter. This is how I sense a viral infection is spreading inside my cells. I can have tests processed that will produce numerical data, graphs and diagrams reflecting a bacterial or viral infection. But I will have already sensed the interspecies relation occurring with my body as the words "infection" or "illness" have emerged. The title suggests a liminal space existing at the crossroads of the visual and imperceptible realms in scientific (and artistic) imaging practices.

The very term viral is a complex one that is both concrete and abstract. In Latin the word "virus" literally translates to mean slimy liquid. The idea of the viral is implicit in this definition, connoting the virus as both noun (entity) and verb (movement). Also implicit in this term are viscerality and movement of the unseen; the uncontained; what is alive and undead. The undead in this sense, suggests a threshold of liveliness where the distinction between living and dead is not clear. The scientific classification of "virus" refers to it as living when fused with cellular metabolisms. Yet, viruses exist whether perceived or not; as "undead" until they merge with a cellular metabolism. As such, the threshold of "living" viruses is subjected to scientific inscriptions when they transduce living

cells. They are also known to exceed such inscription when moving through the realm of potentiality.

The viral, then, is an event that moves through the virtual. In keeping with the sensation and movement of the viral infection described in the previous paragraph, the viral will have already changed relation with its human cellular host during the time of measurement. The viral occurs and incurs within vision and in excess "potentiality". As philosopher Brian Massumi proposes,

> "The time of the event does not belong per se to the body in movement-vision or even to the body without an image. They incur it. It occurs to them. As time-form it [the event] belongs to the *virtual*, defined as that which is maximally abstract yet real, whose reality is that of potential—pure relationality, the interval of change" (58: 2002).

Following Massumi's notion of the virtual, the viral moves through the threshold of potential: the not yet named. In this sense, the viral is both virtual, in the sense that it exceeds such inscription, and also actual, in that it is inscribed into the world of humans as a finite thing.

The way humans encounter the viral occurs though enpresenting. Joost van Loon suggests that enpresenting is a method of inscribing the viral that is not merely recording and documenting movements originally occurring in the past. Rather, "Enpresenting is a 'bringing into being', it is neither 'presenting' nor 'representing' as both notions imply a difference between essence (real) and appearance (image)" ("A Contagious Living Fluid" 112). The act of encountering

the viral, whether through the lens of laboratory science, medical science, or art actualizes the threshold of liveliness between the virtual and its inscription.

The viral is the force that enpresents the event and its documentation. Such a relation is transversal; each evokes the liveliness of the other. Performance and documentation do not function as presentation and representation, where one precludes the other. Through enpresentation, performance and documentation are encountered as presentation and representation depending on the point of view (temporal-spatial and durational). This encounter is experienced through inscription and is in excess of the human narrative. Viruses and the viral are exemplary of zoe life and its excess. It is from this point of view of the viral that we find ourselves in the zone of imperceptibility and in relation with the non-human zoe.

III. MARKING *LIVING VIRAL TATTOOS*

To explore the zone of imperceptibility and zoe as they inform the viral, I engaged hands-on in the laboratory with scientific protocols. By working with tissue culture engineering protocols and cell culture to create the *Living Viral Tattoos*, I was able to contemplate the notion of the viral through learning and applying biological synthetic viral vectors and staining agents as both material and object of artistic creation. (see methodology section Chapter 2).

I worked with the biological synthetic retrovirus called Lentivirus. The synthetic Lentivirus, unlike the wild cold virus, is engineered by humans. The virus used for the *Living Viral Tattoos* project was designed and manufactured in a biotech company in the US. The company used a computer sequencing

Fig. 15: Explant tissue donated to the project
Photograph credits: Tagny Duff and Maria Grade Godinho (2008)

database to compose the custom design of the virus with red fluorescent protein marker (RFP). Based on the sequence, plasmids were assembled in the lab and then inserted into cells to grow (in this case mammalian 293T cells). Once the cells were identified with a viral count, the number was recorded, they were frozen in vials and then mailed to me. Once the frozen vial arrived, I thawed it and distributed it into HaCat cells to grow more viral cells.

This particular virus, a non-pathogenic strain of HIV-1 packaged in mammalian cells, is used routinely in biosafety level two laboratories to deliver gene and protein markers for laboratory research. The extensive research into

retroviruses like HIV and Leukaemia since the 1970s has led to the discovery of how these types of viruses—unlike other viruses such as the common cold—have a reverse transcriptase enzyme which facilitate the production of DNA in its host cell's RNA genome. Today, retroviruses are routinely used for delivering bioluminescent marker genes, such as the jellyfish Aequorea victoria otherwise known as GFP (Green fluorescent protein). These markers found in cell specimens are detected under ultraviolent light. This is the visual technique used to observe and see cellular mechanics.

What is particularly noteworthy is that viral vectors, long used as image-producing devices in science, are rarely discussed or considered within the context of media art or performance. Microscopy images of cells and now viruses are often used in representational forms of visual media (particularly microscopy and the scanning electron microscope) where abstract forms are framed within a discourse of representational art and beauty. However, engaging with the performance and materiality of cell culture, let alone viral cells, is not commonly accessible to researchers and studies from the humanities and arts.

I came to see the practices of staining tissues as a kind of micro tattooing. The pipette aliquots chemicals that stain various proteins and enzyme reactions. In a sense, the pipette shares certain qualities of a sterile needle, allowing the user to carefully insert liquids. This function creates patterns of colour that are then inscribed with scientific and aesthetic content. Symbolic and metaphoric associations become entangled in scientific inscriptions. As such, the ritual of marking and documenting bodies, framed as an art form such as tattooing, connotes aesthetic intentions, as it does with ownership and the

instrumentalization of bodies. When I refer to biotechnological processes as tattooing, I am acknowledging that cellular and molecular bodies have obtained a new kind of (im)materiality that is territorialized and deterritorialized by technoscientific and artistic practices.

I conceived of the process of transplantation and the means to trace the movement of cells as a micro tattooing in the form of a bruise: a viral bruise. The act of transplantation was amplified and documented not by the creation of colourful or aesthetically pleasing stains. Rather, a bluish brownish stain was created reminiscent of a rather unpleasant looking bruise.

The staining process used to render a bruise formation occurred through various chemical reactions. Immunohistochemical staining is a common practice in the scientific laboratory and was a primary technique used in the work. The movement of viruses through cells and tissue is documented through the reactions of antibodies and the production of antigen in cells that are stained with colour dyes observable to the naked eye.

This mode of inscription can structurally alter the cells and cause cellular damage. In a very physical sense, it becomes apparent that the mode of visualization or "marking" of molecular and cellular entities for human observation changes their structure and movement. This trace of infection documented and enpresented the viral simultaneously, revealing excess in its visual inscription. This realization figures predominantly in the working conceptual premise of the bioremediale image.

The bruise visually inscribes the presence of viruses and the application of tissue engineering. On one hand, the bruise is a phase of both growth and death of cellular entities with a circulatory system. On the other, given that the skin *in vitro* is not attached to a metabolic system and a contusion injury has not occurred, a bruise is not scientifically feasible. This bruising suggests the potential for what might have been in wet bodies used *in vitro* and *in vivo*. It can been seen as a memory of bruising that has or will have occurred in wet bodies used for various laboratory experiments.

Since the event of transplantation and staining, the fleshy viral tattoos have been placed in paraformaldehyde fixative in glass jars. As such they are considered dead and preserved. But are they? (This question is explored in more detail in Chapter 4). As argued in the Chapter 1, the *Living Viral Tattoos*, in their sculptural, photographic and video form, may be considered as bioremediale images that are living documents, evoking liveliness. They are both presentations and representations of the performance in the lab. As enpresentations, they remind viewers of the unstable and transient bioremediale qualities of performance and documents. In a material sense, the skin tissues are changing forms as the fixative continues to bleach and disinfect them. The stained bruises are becoming difficult to see. The visible bruises are fading, but the virtual bruises remain. The liminal status of the bruises and the viral evokes the dialectic of regeneration and violence implicit in documentation practices of capturing and preserving bodies across science and artistic practices.

IV. READING VIOLENCE IN THE BIOREMEDIALE IMAGE

The impulse to make a mark on skin through the creating of images of bruises with viral vectors is implicitly a creative and violent one. By engaging in tissue culture practices and methodologies and manipulating life in all its forms in the laboratory, I am implicated as an accomplice to the deliberate sacrifice of viral cells and implicitly this engages in violence. At times I deliberately induce cell death because the cell culture is contaminated with a bacteria. Cells must undergo cell death through fixing before they may be imaged with the scanning electron microscope and the fluorescence phase microscope. The killing and sacrificing of cells also occurs frequently outside of the laboratory. One may, for example, kill many more cells just by brushing one's teeth.

My intention when working with cell culture is to circumnavigate complicity in these often overlooked forms of violence by reflecting and, in some cases, exposing the complexities around the growing and sacrificing of zoe life in the laboratory context. The zone of indiscernibility and place of violence becomes more acute in the crossover between the human bios and the animal zoe (more on this in the next chapter).

Synthetic viruses and viral cells are engineered to comingle with mammalian cells, and as such animals and on occasion human-animals[32] exist as zoe in the laboratory. Some critics are concerned that artists who work with life, such as mammalian cell culture, are contributing to the instrumentalization and violence of zoe life. In her article "Leonardo's Choice", art and cultural theorist Carol Gigliotti comments that bioartists working with biotechnology

[32] The case of Henrietta Lacks is an example.

Fig. 16: *The Semi-Living Worry Dolls* (2000)
Artists: The Tissue Culture & Art Project

Hosted at SymbioticA – School of Anatomy, Physiology and Human Biology, The University of Western Australia
Medium: Living cells, Biodegradable/bioabsorbable Polymers and Surgical Sutures – fixed in formaldehyde
Dimensions of original: 2cm x 1.5cm x 1cm
Date: from The Tissue Culture & Art Project Retrospective, Crude Life, Laznia Centre for Contemporary Art, Gdansk Poland 2012

reinforce the violence against animals that they seek to expose. Her concern, however, is misdirected at artists (and scientists) who are working with cell culture *in vitro*. Tissue culture engineering may be seen as an ethical alternative to traditional *in vivo* experiments that use animals for research. As artists Oron Catts and Ionat Zurr of Tissue Culture & Art Project (TC&A) point out,

> "The work we produce as the Tissue Culture & Art Project employs the very same techniques recommended by animal rights

> organizations, and yet Gigliotti accuses us of following paths 'which are littered with the bodies and lives of millions of animals'" ("The Ethics of the Experiential Engagement with the Manipulation of life" 131).

TC&A note that the criticism directed at artists for perpetuating violence against animals by working in the laboratory is often misplaced. Indeed, the well-known animal rights group People for the Ethical Treatment of Animals (PETA) has upheld that *in vitro* scientific research is, at this point, an ethical alternative to *in vivo* testing. PETA has actively promoted the practice of *in vitro* cell culture in the fashion industry to curb the practice of animal testing. This is articulated in PETA's recent newsletter:

> "After uncovering evidence that some formerly cruelty-free companies—including Avon, Mary Kay and Estee Lauder—started paying for tests on animals in China because the Chinese government requires cosmetics companies to fund such tests before their products can be sold in that country, PETA immediately called on the scientific experts at the Institute for In Vitro Science (IIVS) and offered to jump-start a plan to work with and train scientists in China on how to test cosmetics in test tubes instead of on animals" (12).

What TC&A and other artists seek to do is reflect upon and expose the complexities of how representations of zoe and bios in the laboratory are perceived. Rather than suggest artists and scientists stop laboratory research altogether, it is necessary that the visibility of the complexity of this bruising and

violence committed in the name of knowledge representation, and the relegation of the non-human including animals and microbes to the forgotten zoe, have a place for discussion and reflection. This violence impacting zoe (and bios) is not what one might assume it to be, nor is it obvious, as TC&A point out. By engaging and consciously reflecting on the processes of biotechnology, artists such as TC&A reveal many of the complexities involved in manipulating and representing life that scientists may not be at liberty to discuss in a public context.

One of the most common concerns raised by critics of the *Living Viral Tattoos* is around the use, origin and ethical consent of the donated human skin

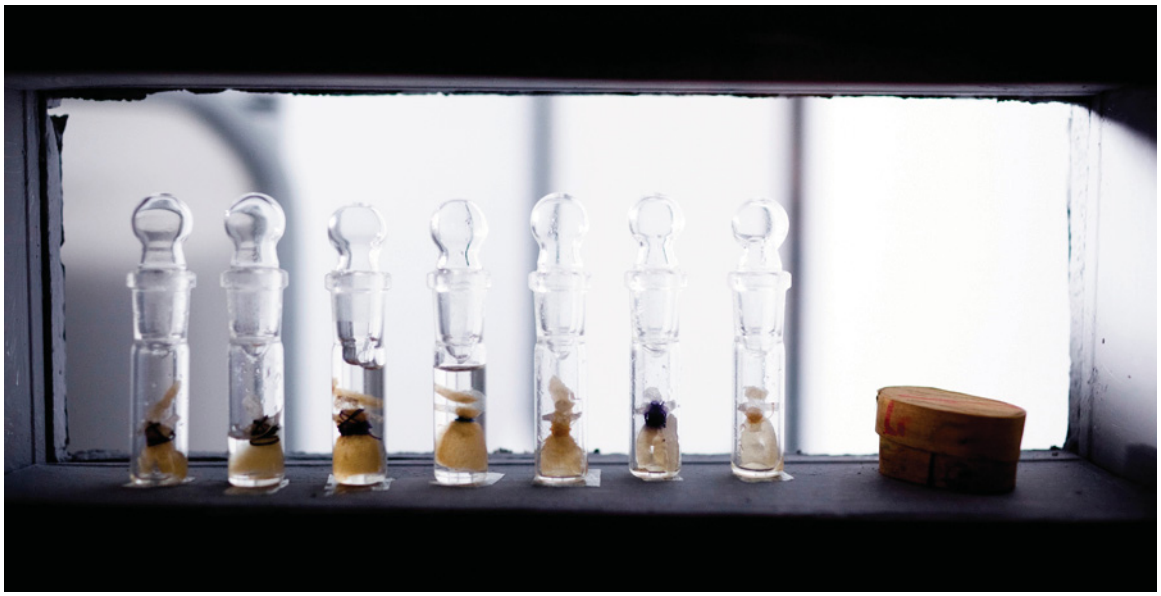

Fig. 17: *Semi-Living Worry Doll H* (2000)
Artists: The Tissue Culture & Art Project
Hosted at SymbioticA – School of Anatomy, Physiology and Human Biology, The University of Western Australia
Medium: McCoy Cell line, Biodegradable/bioabsorbable Polymers and Surgical Sutures
Dimensions of original: 2cm x 1.5cm x 1cm
Date: from the *Tissue Culture & Art(ificial) Wombs* Installation, Ars Electronica 2000

used in the project. While the tissue was given with full (and enthusiastic) consent by the donor, who felt that it was well used in an artistic context, the pigskin used for the project is rarely commented on. In fact, the pigskin was procured from a butcher shop. When I asked to purchase the pig skin from the butcher, he said he would give it to me for free because he couldn't sell the "parts" that day and was going to throw it away in the garbage. The drastic difference in value equated to human skin (removed by elective cosmetic surgery) that costs thousands of dollars in resources (for both the donor and myself as the funded artist-researcher) and that of a pig's life that was taken to provide meat for sale for eating (worth nothing) is a glaring contrast. My decision to include the pigskin in the project embraces an ethico-aesthetic and ecosophical strategy in an attempt to expose how the zoe is devalued in relation to bios as it corresponds to the human standard.

This concern for the forgotten other or the zoe life in the pig, the human-animal's close kin, is also seen in the bioremediale images created by UK performance artist Kira O'Reilly. Her writing, photographic documentation and performance art work expresses the human's connection to the laboratory animal—in particular, the pig. During O'Reilly's project at SymbioticA in 2006, she also worked with cell culture in the laboratory. An exercise in dissection of a pig resonated with her and became a source of reflection for the human-animal relation and the forgotten zoe. In an article published in *Sk-Interface*, O'Reilly writes:

> "When my clumsy blade accidentally tears her gut I see pigs breakfast spill. In my minds eye I see my breakfast spill.

Following the pig biopsy I feel deeply ashamed.

You stupid, stupid cow."

When O'Reilly returned to the UK after her residency at SymbioticA, she performed *Inthewrongplaceness* based on elements of the text she wrote above. For this work, O'Reilly, laying nude with the carcass of a pig, proceeded to caress the animal, exposing the interior cavity and the uncanny similarity of skin that she shared with the pig. The action that O'Reilly performs speaks to her respect and love for pigs and other such

Fig. 18: *Inthewrongplaceness* (2005)
First performed at Home, Camberwell, London, January 2005
Artist: Kira O'Reilly
Photographer: Manuel Vason. Printed with permission. Images retrieved from Tract Live Art web archive (January 2014)

creatures used in research. It is a ritual of respect for sacrificed animals. What O'Reilly does is to unabashedly show the viewer the violence done on animal bodies and put her own body on the same visual plane. The line between sensuality and violence, love and sexuality becomes ambiguous in the bioremediale images she creates.

The performance of *Inthewrongplaceness* was documented with photographs, and when the images began circulating on the Internet, members of the animal rights activist group PETA decried the performance and applied pressure on the UK's arts council to revoke O'Reilly's sponsor's support for the project. Given PETA's own spectacular performances used to denounce animal cruelty and the fact that *in vitro* science and cell culture research that O'Reilly was engaged in for the research project led to the performance, it is somewhat confusing that O'Reilly's performance would shock or annoy animal rights groups. In fact, a recent statement in *PETA's Animal Times* from the director of PETA acknowledges the performance strategies they use to bring awareness around animal rights, which have an uncanny similarity to experimental performance art. It notes; "Sometimes you have to titillate, shock and annoy people in order to call attention to an emerging social issue" (14). In this case, PETA misread the image that O'Reilly created with the image of the pig, and more importantly the complexity found when representations of zoe and bios collide.

Flushing out the complexities of encountering liveliness, as seen in the bioremediale image requires attention to the process, materials, and life forms embedded in the project, rather than responding to the image with quick reading. As noted in the introduction, the danger of supporting a "quick take"

Fig. 19:
Inthewrongplaceness, (2005)
First performed at Home, Camberwell, London, January 2005
Artist: Kira O'Reilly

Photographer: Manuel Vason. Printed with permission. Images retrieved from Tract Live Art web archive (January 2014)

view on performance and documentation exploring liveliness through the frame of biotechnology and beyond can polarize modes of knowledge creation without engaging in the subtleties, complexities, and mangles within the various agents and fields.

To help unpack some ways of reading the bioremediale image's liveliness, an ecosophy is needed. Ecosophy, as Guattari suggests, is a means for human

society to explore and reflect on violence as a way to see itself as it is, not as it wishes itself to be. To deny the opportunity to explore the complexities of violence is to deny and suppress its existence. It does not end the violence, but rather, merely displaces it.

V. ETHICO-AESTHETICS AND BIOREMEDIALITY

By exploring the complexities of violence, another side effect and affect of violence emerges: that of regeneration. A violent force that impacts the structural integrity of the skin may also lead to generative and restorative relations. Ecosophy, coined by philosopher Felix Guattari, is a philosophical engagement with the ethico-political whereby humans move away from a technocentric culture and recognize the interrelation between the environment, social relations and human subjectivity. Ecosophy calls for a broader understanding of social ecology where "Instead of clinging to general recommendations we would be implementing effective practices of experimentation, as much on a microsocial level as on a larger institutional scale" (24). This entails looking not at the subject per se, but at "subjects of subjectification" (24) such as the microsocial events occurring in risk society and the tendency towards preemptive risk (examined in detail in the next chapter).

Artists working with biomedia and in relation to the science laboratory do more than borrow metaphors or concepts from the sciences; rather, we may expose methods and practices guarded by specialized domains by rendering those processes and material practices to various publics. Artists revision and reimagine the potential and dangers embedded in biotechnological

manipulation and representation of life, and provoke society to reflect on the complexities of such practices. Occasionally, such reimaginings may be perceived to be threatening to public(s); however, such provocations are necessary. This follows what Guattari notes in *The Three Ecologies*,

> "Any persistently intolerant and uninventive society that fails to 'imaginarize' the various manifestations of violence risks seeing this violence crystallized in the Real" (38).

The biological artist imaginarizes violence as a question or mode of contemplation for society and various publics to consider. For example, artists may seek to expose the mode of violence implicit in the representation and use of techno-scientific tools and objectification. The history of eugenics may surface in the dark undercurrent of the history of violence in the name of science and progress. This uncomfortable recognition, evocation and remembrance of violence in human history is the realm of the visual and media arts— a field that is no stranger to confronting the abject.

VI. CONCLUSION

The engineering of viral vectors as gene markers has been practiced in many scientific laboratories for over twenty years. Yet it is relatively novel to consider viral vectors as vehicles for creating visual traces and marks in cellular pathways from an artistic and humanities perspective today. As the *Living Viral Tattoos* show, the creation of images for art and humanities-based research is no longer relegated only to the page, the screen or 3D space. Lifeforms, like viral cells, are used to make images and in some cases they are the image.

Fig. 20: Pipetting viral cells onto explant tissue
Photograph credit: Tagny Duff (2008)

Zoe life—that is, the non-human animal—has a large role to play in how humans create knowledge via image-making practices. What is of particular concern at this juncture is how violence is enacted when zoe and bios collide in the realm of the representational image and something else in excess of the representation is generated. The bioremediale image is open to multiple readings across systems such as art and tissue culture engineering. However, misreadings, misunderstandings, confusions and violence may be evoked by such images. An ecosophy is particularly necessary when images leave the constraints of the laboratory and enter into the social realm of the public art

gallery to help situate the complexity of the image across and artistic and scientific modes of reading.

In the next chapter, I explore how the public exhibition of the *Living Viral Tattoos* exemplifies some of the challenges of reading the bioremediale work outside of the laboratory context. Whereas the work viewed in the lab context met with some praise from my scientist colleagues and mentors for the rigour of the visualization process and lab techniques that I used to create the image on the donated skin, the same work met with a very different reaction from the organizers of the exhibition of the *Living Viral Tattoos* at the Ormeau Baths Gallery in Belfast, Northern Ireland. The following chapter explores how the epitexts, photographic images, and project name of *Living Viral Tattoos* generated a liveliness that exceeded the quality of liveness embedded in the fleshy sculptures. The liveliness of the bioremediale image provoked a strong resistance by gallery directors to exhibiting the work in public and eventually, led to the exhibition's cancellation. In this case, the fleshiness of animal-human skin and fixed viral cells in the form of sculptures become relegated to zoe—the non-human other that is excluded from bios and the sphere of the political, only to re-emerge front and centre in public discussion.

CHAPTER FOUR:

Out of the lab: Bioremediale images, unnatural participations and risk society

I. INTRODUCTION

When we humans walk in a city, run through the halls of a busy airport, roll through a bus terminal or a train station, we are travelling through not only streets, hallways and stairs, but through microbes. Viruses, bacteria, yeast float in the air, in walls, in moving human bodies. We move these microbes, just as they move us. The limitations of barriers and borders are not clear—if they exist at all. But in a risk society we are reminded of how the unseen world of microbes and other imperceptible bodies and events may be dangerous, hazardous and risky. Airport surveillance systems scan our eyes, our fingertips and bodies for signs of unnatural participation at security checks and country entry ports. The exchange of identities, fluids, and money is strictly contained and defined at a man-made border. What and who may be repurposed or refashioned as a healthy body, a visitor, a citizen, and a fugitive is created through these points of surveillance.

The use and application of biomedia such as bacteria cultures and viral vectors in contemporary artistic and scientific research may provoke anxiety in a global risk society—a society, as sociologist Ulrich Beck suggests, focused on decision-making processes that preempt risk and control uncertainties. In this chapter I explore how the cancellation of the 2009 exhibition of the *Living Viral*

Tattoos at the Ormeau Baths Gallery is exemplary of the global risk society's tendency to use preemptive measures to prevent biomedia and bioremediale images from entering into the public domain for the "good" of public safety. This non-event also exemplifies the thesis that bioremediale images generate a threshold of liveliness that both informs and exceeds the biological organism or bioart work in its wet material-based form. The human relation with microbes and unnatural participation situated within an ecological perspective is explored. The necessity for an expanded mode of readings such images is called for, particularly with the emergence of a crisis-focused risk culture today.

II. EXHIBITION OF *LIVING VIRAL TATTOOS* (ISEA 2009)

The exhibition of the *Living Viral Tattoos* in their wet fleshy form never took place at the Ormeau Baths Gallery. The cancellation of the event, in actuality, turned out to be a productive non-event and public performance. It is worthwhile to note how the reception of bioremediale images from the *Living Viral Tattoos* may have in part contributed to this non event. Let me first situate some anecdotal recollection of events, fully aware that using academic text and narrative to restage the non-event that I experienced as an artist ultimately reframes the event and its affective modality. At the time, the event was embroiled with passionate concern, confusion and anxiety by many involved. Five years later, and many exhibitions of the works since, provide additional perspective to reflect on the impersonal forces of a global risk society—with its singular cultural and national specificities—that may inform public reception to bioremediale images.

In 2009, *Living Viral Tattoos* was selected by the International Symposium for Electronic Art (ISEA) jury for exhibition at the Ormeau Baths Gallery under their Posthumanism stream. The work was accepted by a double-blind international peer-review panel, and it was to be the first public exhibition of the work. I was particularly excited by the theme and venue that would house the work. The arrangements for the work's exhibition followed a standard process. I sent information schematics including photographs, diagrams and text for installation and shipping arrangements, dates were confirmed for travel arrangements for me to set up the installation, and press information was relayed. Just before the flight tickets were to be purchased, I received an apologetic email explaining that the work could no longer be exhibited because of concern for public safety.

The details of the cancellation of the exhibition of the *Living Viral Tattoos* are noteworthy in that they reflect how the reading of the bioremediale image may provoke irrational concern for public safety. The main reason given for the cancellation of the work was concern related to bringing biohazardous materials into the gallery. It was not clear whether it was the liquid that the tissue was preserved in that was considered biohazardous (which would be the element that most concerned me as the artist) or the perceived potential of the tissue to be infectious (which could not be possible given the fixative process).

Originally the sculptures were preserved in low volumes of paraformaldehyde, which is a chemical substance classified as biohazardous, and one often used for public display of specimens in science museums and for the preservation of specimens. The organizers were notified on two separate occasions that the sculptures had been moved to phosphate buffered saline (a

non-toxic solution) with only 1% paraformaldehyde, considered below the minimal amount to qualify as a hazardous substance according to the Australia Transport Safety Bureau regulations. Usually with this type of low concentration, the chances of negative health repercussions should there be a contact between the liquid and a human because of a spill (i. e. broken class etc.) is very low. What resulted was confusion about the meaning of "hazard"—a recognition of possible prevention methods that are commonly identified and specified to deal with accidents that may occur with materials—with that of "risk"—which suggests a more serious possibility of uncertainty, and warrants decisions that preempts risk—in this case, to "public safety". Rather than request information directly from the artist (me) about the types of hazards the work may pose, the gallery assumed information from elsewhere.

Once the gallery directors refused to exhibit the work at the Ormeau Baths Gallery, the ISEA organizers attempted to re-situate the work at the University of Ulster. However, after the curator identified a location within the university for the installation, another issue emerged. The university researchers in charge of the exhibition at the university sent me an email explaining that the exhibition of the work at the university had to be cancelled. The reason provided was that the UK Human Tissue Authority told organizers that they needed a license to display human tissue, which would take months to obtain. As the show was scheduled to open approximately two weeks from the date, it was clearly impossible to obtain the permit in time. When I received the email I was surprised to learn that such a license was required of biological works and proceeded to research the legalities. I reviewed The Human Tissue Act (covering the UK and Northern Ireland) and discovered that licenses to publicly display human tissue are required for materials obtained from deceased human bodies. The *Living Viral Tattoos* sculptures contain skin donated consensually

from a living human donor with the express understanding that it would be used in an exhibition context. Therefore, it was apparent that under UK regulations, the sculptures did not require a licence to be exhibited in public. When I relayed this information to the organizers, it did not change the assessment of the work, which was finally omitted from the exhibition altogether.[33]

Fig. 21: Autoclave used to decontaminate and sterilize instruments
Photograph credit: Tagny Duff (2008)

[33] After the final cancellation of the work, I was invited to the ISEA conference to sit on a panel "Is the (Art) World Ready for Bioart?" to discuss the event with the curator, organizer and invited guests Andy Mia and Anna Dumitriu.

III. RISK SOCIETY

In the case of the *Living Viral Tattoos*, the implicit critique around the overdetermination of risk in what Ulrich Beck has termed "risk society"—signified by the evocative, ironic and deliberately ambiguous title "*Living Viral Tattoos*"—was missed, and in fact worked towards the exhibition's demise in Belfast. Beck's early writings on the risk society in 1986 observed how the language of threat was emerging, particularly as science made the perception of risk more acute. Twenty years later, post 911, Beck observes how the semantics of risk continues to play a major role in a globalized world and the cultural imaginary. As Beck notes,

> Nowadays the semantics of risk is especially topical and important in the languages of technology, economics and the natural sciences and in that of politics. Those natural sciences (such as human genetics, reproductive medicine, nanotechnology, etc.) whose speed of development is overwhelming cultural imagination are most affected by the public dramatization of risks. The corresponding fears, which are directed to a (still) non-existent future, and hence are difficult for science to defuse, threaten to place restrictions on the freedom of research. (*Word At Risk* 6)

Beck's notion of risk, which he situates in the fields of technology, economy, natural sciences, and politics, applies similarly to artistic projects that converse with technoscience, particularly around new technoscientific processes and research exploring uncertainties of life and liveliness. *Living Viral Tattoos* is a clear example of how the semantics of risk performs in artistic

projects that use biomedia to critique the cultural perceptions of life. The title "*Living Viral Tattoos*", for example, intentionally suggests uncertainty around the status of viral transmission and liveliness. As mentioned previously, the viral is assumed to threaten boundaries of the self and body, and to implicate the status of health and well-being. The title, in juxtaposition to the exhibition of actual human flesh and fixed viral cells, suggests uncertainty and therefore evokes the semantics of risk. If the flesh is intact and appears lively (as evidenced by the title, photodocumentation and the sculptures themselves), might the viral cells still be viable and dangerous even if the artist or scientist claims they are fixed? How do the preservation and visualization techniques ensure that the risk of infection is removed? The meaning implied by the title—that of living marks on skin made by viral vectors, in contrast to the scientific process of fixing and killing cells—connotes an uncertainty in the spectrum of life and liveness and its relation to contemporary risk culture.

The fears that society may have around viral epidemics or infection, as Beck outlines, are founded on a non-existent future, what he situates as "risk". His earlier thesis on risk society focuses on the idea that risk is preempted by the anticipation of catastrophe, which may then bring such events into being. Risks, he argues, are therefore constructions of human cultural perceptions that may be brought into the real via the semantics of risk and the cultural imaginary.

> [T]his does not mean that there are no risks, that risks are illusions, products of a widespread alarmism or the sensationalism of the mass media. However, it does mean that nobody can appeal solely to an external reality in dealing with risks. The risks which we believe we recognize and which fill us with fear are mirror images

> of our selves, of our cultural perceptions. And global risks become real in this antagonism of cultural certainties or against the backdrop of an emerging global solidarity. (*World At Risk* 13)

It is important to note here that while I agree that cultural perception and reception to uncertainties of life and liveliness have a large role to play, there is a danger of relegating risk to a purely social constructivist point of view. The role of 'hazard' in the process of knowledge creation and production cannot be overlooked. So while cultural perception of risk arguably has a large role to play in producing risk, this does not dismiss the fact that hazards exist and can be identified to contain various accidents and other such uncertainties. In this sense, artworks engaging with technoscience and the bioremediale image, such as the *Living Viral Tattoos*, speak to the "schism" that exists between the scientific understanding of hazard and risk and the cultural perception of risk.

In Beck's updated version of the risk society, he situates risk within a "world stage", and notes how the distinction between risk and cultural perception of risk is becoming blurred. (*World At Risk* 11) Furthermore, he outlines how the notion of the world at risk goes beyond the thesis of the society of risk in that "global risk is the staging of the reality of global risk" (10). This staging is situated in globablization and operates on three logics: environmental, economic and terrorist (13).

In the case of the *Living Viral Tattoos*, the concern around the safety of the work can be seen as situated within this emerging global staging of global risk—particularly that of the H1N1 pandemic. Rather than being seen as a provocative agent of reflection on global society's current tendencies to

anticipate and stage risk around the use of biomedia, the work was perceived of and then preempted as a biohazardous risk for infection and/or bodily harm. Science studies scholar Joost van Loon has written in Risk and Technological Culture about how a similar situation arises when risk analysis is ruled by the same information it uses to prevent risk in the context of technoscience. The gallery directors' decision to cancel the exhibition of the work functions in a similar way. In this case, the public safety and risk prevention strategies used to ensure the safety of the audience prevented the presentation of an artwork explicitly seeking to create a sense of uncertainty in the public audience. To bypass this disciplinary cul-de-sac of risk analysis applied in art production and display, additional disciplinary perspectives are required when approaching the bioremediale image. Van Loon outlines a similar sentiment, but in the context of technoscience. He states that people:

> require not only far more information but also the skills to interpret them. [*sic*] The catch is that this information is itself fed by the same technoscience that generates the risks. In other words, 'conscious consumption' is itself enframed by the technology that revealed its risks. This paradoxical phenomenon repeats itself in discussions over genetically engineered food, over waste and packaging, over transportation, over diets, etc. (*Risk and Technological Culture* 30)

As van Loon notes, fostering alternative forms of interpretation skills and information sharing is necessary to counteract misinterpretation and repetition of preemptive risk scenarios that may not apply to various situations. The bioremediale image has an important role in this, as it demands a reading of

images across artistic and scientific fields without reducing one to the other. As performance studies scholar Adele Senior notes, a scientific understanding of the material process of bacterial transformation, a process of gene transfer learned in high school and undergraduate level biology, is necessary in reading the work within its artistic context. She explains:

> One wonders, for example, whether learning and undertaking a procedure such as bacterial transformation has given rise to, and was necessary to the development of, Canadian artist, Tagny Duff's concern in *Living Viral Tattoos* with visualisation methods in science: the presentation of viral cells and skin as aesthetic objects questions the dependence of scientific fact upon colour and other visualization techniques currently used in creating, representing and generating scientific data (Duff 2009). Duff's piece employs the red equivalent (RFP) of green fluorescent protein (GFP), which we used in the process of bacterial transformation and which is employed in scientific research as a visual marker of gene expression. The application of RFP in Tagny's piece has no scientific relevance or value as such, but by making visible and documenting the movement of the virus through the tissue, it puts into question the liveness "of a biological material (a virus) that is ordinarily considered by the scientific community to be non-living". In doing so, Duff‘s artwork enacts a critical approach to the life sciences that, one could argue, depends on a detailed understanding of scientific visualisation techniques, viruses and markers such as GFP and RFP that can only be gained from working with these materials. (280)

In a global stage of hypermediated images, inclusive of the art and science milieux, the material processes and image representations of biotechnology and emerging technoscience are not understood, nor in many cases studied. Rather, the details and singular modes of knowledge creation are left to the "experts" and representations are circulated within the spectacle of global communication networks. *Living Viral Tattoos*, as a bioremediale image, insists on an engagement by the viewers with the specificity of scientific processes beyond representation and spectacle of life and liveliness. Van Loon also identifies how the risk society promotes a reductive state of technological culture devoid of difference and singular knowledge sets and processes: "the risk society inaugurates a turning in technological culture in which science and fiction, innuendo and matters of fact, evidence and speculation all become equivalent signifiers in a frantic global spectacle of sense-making" (*Risk and Technological Culture* 145).

In this case the representation of the microbial and ecological crisis in contemporary risk culture must be addressed in their singularity, and the way they are circulated via images are especially important. As van Loon outlines, the ubiquitous distribution of technological culture has rendered a type of equivalency of signifiers that reduces a range of knowledge sets to the same plane of sense-making. The theme of ISEA identified this same concern through the explicit declaration on its website that staging artworks can be a strategy to challenge bioconservative and technoprogressive ideologies through more complex readings, as noted on the conference website statement the panels and art works were to be:

> manifested through a range of biopolitical events, along with an aesthetic staging of bioethical encounters [that] ruptures the polarized views of bioconservatism and technoprogressivism, provoking a series of conflicts that demand multi-layered conceptual apparatus to unravel. (ISEA conference website 2009)

The cancellation of *Living Viral Tattoos* illuminates the fluctuating views of bioconservatism seen in risk society via the reaction to the manifestation of unnatural participations of humans and biomedia, particularly synthetic viruses, biochemicals, human tissue and cells. It also reveals how technoprogressive ideologies that in theory support the exhibition of biomedia may be inadequate for practical matters such as providing necessary resources for exhibiting biological artworks. In other words the rhetoric of the event supported theorizing the posthuman and unnatural participations between the human and non-human, while the concrete application of these questions—via the use of biomedia—could not be supported within the frame of a risk culture and society at that particular moment in history.

IV. RISK CULTURE, BIOPARANOIA AND *LIVING VIRAL TATTOOS*

As mentioned previously, a catalyst for the cancellation of the show and concern about the sculptural objects in the work may have been related to fears and concerns around infectious viruses circulating at the same time as the conference. The flu virus H1N1 was emerging in Northern Ireland and the UK just before the exhibition. The climate of fear around public infection of H1N1 was at its peak in 2009, and the spectacle of surveillance and quarantine of travelers added to the anxiety around infectious agents and bodies, even if very

few, if any are contagious. As the art group Critical Art Ensemble (CAE) observe, the climate and culture of bioparanoia emerges as spectacle: "Hyperstimulating the imaginary of individuals with fears of a loss of bodily integrity is one of capital's most common energizing spectacles" ("Bioparanoia and the Culture of Control" 414). Stimulating fears, in this case of infection and disease, is a function in risk society. In this society, various types of biomaterial are perceived to be dangerous to bodily integrity and preemptive measures are taken to prevent contact with the imperceptible invader.

The decision to cancel the exhibition of the work was based on compliance with the law and risk assessment, and as a result, risk was produced. Ulrich Beck characterizes the risk society as transforming uncertainty and hazard into decisions preempting risk. Such an impulse works to contain threats to globalization and flow of capital in a post-industrial era. He notes:

> Risks always depend on decisions—that is, they presuppose decisions. They arise from the transformation of uncertainty and hazards into decisions (and compel the making of decisions, which in turn produce risks). The incalculable threats of pre-industrial society (plague, famine, natural catastrophes, wars, but also magic, gods, demons) are transformed into calculable risks in the course of the development of instrumental rational control, which the process of modernisation promotes in all spheres of life. ("Risk Society and the Provident State" 30)

Artworks utilizing biomedia implicitly participate in the flow of capital and global circulation that are monitored for risk to environmental safety. Decisions

around how to control biomedia within the laboratory, the public art gallery and during transport are a large unseen part of working with biomedia and wet bioremediale images. In order to make biological work, the artist, just as the scientist, must obtain approval from nationally regulated university health and environmental safety committees before working with biomedia in the laboratory and in some cases the art gallery. On some occasions the conversations about safety overlap with those had on ethics committees and boards. Questions may arise, such as, will the audience be physically and emotionally safe? Will the identity of the donor of the tissue be protected? Despite all the precautions artists and scientists take to identify potential hazards, a necessary and advisable process when working with biomedia, there remains uncertainty. Risk, however, is another matter. Hazards and accident may occur, but risks operate as reminders of what cannot be contained and controlled (van Loon, Beck 2011). As van Loon puts it simply: "Risks are always threatening to take place, they never take place (as disasters do). They are events-in-becoming. Without symbolic forms, risks are nothing" (*Risk and Technological Culture* 29).

Considering the notion of risk in the sense that van Loon describes situates the events around the exhibition of the *Living Viral Tattoos* in a clearer perspective. Bioremediale images are manifested as symbolic forms that may provoke readings of "risk" to the integrity of the human body. They are particularly vulnerable to being perceived as catalysts for generating risk culture, rather than contributing to an ecosophy (see Chapter 3) where the very perception of risk must be reflected on and perhaps experienced differently. A multilayered reading is necessary to situate bioremediale images across various

modes of interpretation spanning languages expressing symbolic and non-symbolic gestures of risk.[34]

What occurred in Belfast with the *Living Viral Tattoos* exhibition is not an isolated case. Misunderstanding around the artistic (and scientific) use of living organisms has occurred in a number of exhibitions and practices featuring biomedia and the bioremediale image. As noted previously, artists like Kira O'Reilly, TC&A and others have faced criticism for both the materiality and messages conveyed by the biomedia they have engaged in and the bioremediale images they have produced. The case of bioartist Steve Kurtz, a member of Critical Art Ensemble, is a particularly relevant (and unfortunate) example of how risk culture may impact artists and scientists working with biomedia for artistic ends. In 2004, police received a 911 emergency phone call

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[34] In the ISEA panel organized to discuss the cancelled exhibition, I presented a paper that attempted to situate the materiality of the artwork in its scientific terms to help illuminate the artistic intent in the work (i. e. I explained how viral cells cannot infect living cells and how the fixing and staining process to make the image of a bruise facilitated cell death and thereby prevented the possibility of a biochemical infection). In this case, as has happened in other public talks on my work, I was criticized for speaking as a scientist. It was suggested that I be more sensitive to the Irish public's fears around infection by toning down my insistence that such concerns be acknowledged and discussed in a public format from both scientific and artistic perspectives. I found this insistence that the work and the concern it generated were not in keeping with cultural sensitivity to be odd, particularly when the work spoke in many ways to the cultural expressions emerging in response to H1N1 from within Northern Ireland and Belfast. It was also strange to be accused of inappropriate framing of the work given the conference mandate that articulated a clear desire to support "the aesthetic staging of bioethical encounters [that rupture] the polarized views of bioconservatism and technoprogressivism, provoking a series of conflicts that demand multi-layered conceptual apparatus to unravel" (from the conference website 2009).

from the home of American artist Steve Kurtz. When the police arrived, they found the body of Kurtz's wife, who had died in her sleep. Police noticed petri dishes full of agar and bacteria cultures that Kurtz was growing for his next art exhibition. The police immediately charged Kurtz with suspected bioterrorist activity (Duke 2004; Pentecoste 2005; Hershmann Leeson 2007).[35] When the US Federal Grand Jury did not support the conviction, the US government charged Kurtz and his science collaborator Robert Ferrell of the University of Pittsburgh Graduate School of Public Health with federal mail and wire fraud for the purchase and distribution of suspicious biological materials. After four years, the charges against Kurtz and Ferrell were dropped when a federal judge dismissed the evidence in the case as insufficient ("Bioparanoia and the Culture of Control").

Artists working with biomedia may provoke the instability of power flow via the materials we engage with. Such provocation may be intentional or unintentional. In this specific case involving Kurtz, it was unintentional, although many of his works prior to the event intentionally challenge policies and interests of Big Pharma and the US federal government.[36] These events serve as probes into the culture of risk and the climate of fear circulating within a risk society. Anxiety emerges when a society apprehends unnatural participation between humans and microscopic life.

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[35] Kurtz discusses the case via video on Democracy Now in a July 16, 2008 interview. http://www.democracynow.org/2008/6/16/art_in_a_time_of_terror

[36] Primarily through his membership in the Critical Art Ensemble, a collective art group internationally recognized for their artistic and political interventions and critique of biotechnology.

V. CRISIS AND UNNATURAL PARTICIPATIONS

How has crisis become such a prominent feature surrounding biomedia, particularly when used in artistic work and research? This is a question that remains five years after the exhibition of *Living Viral Tattoos* was cancelled at the Ormeau Baths Gallery and ten years after the Kurtz case was closed.[37]

Fig. 22: Plenary panel discussion "Is the world ready for bioart?" as part of the International Symposium on Electronic Art 2009, held in Belfast, Ireland
Photograph credit: Anna Dumitriu (2009)

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[37] The *Living Viral Tattoos* sculptural and video work has been exhibited in numerous venues since, including the FoFa Gallery in Montreal (2010), Harbourtfront Centre Toronto (2010), Powerhouse Gallery in Sydney (2013), and ICA/Video Pool in Winnipeg (2014).

Bioremediale images and biomedia evoke a sense of uncertainty and unnatural participation with microscopic and imperceptible worlds evoking concerns of risk to the human body. Unnatural participations may be experienced and felt when nature acts against itself (Deleuze and Guattari). Epidemics, contagious diseases, strange couplings and anomalous events modify assemblages. The unnatural creates movement disturbing the order of things, classification systems and the equilibrium of filiation. Such movement roams through instability, the "what will have been" (Massumi 2002). Humans exist in a precarious relationship with the microscopic interkingdom—a major arena of unnatural participation. We try to defend our bodies against attack from unnatural co-minglings. We try to maintain equilibrium during these moments. Germs are "disinfected". Aseptic technique destroys all potential contaminants. Humans constrict border passages to control the flow of bodies, successfully or unsuccessfully controlling the growth of microbial populations to maintain the equilibrium of the human population. This creates new forms and conditions such as "super bugs", new strains of infectious diseases resistant to antibacterial drugs, all contributing to the conditions of far-from-equilibrium: crisis. Crisis is an unstable status, a phase change, a turning point, a moment of change where the outcome is unknown, but often perceived to have negative consequences in a risk society.

Crisis signals a major shift that may be productive and potentially destructive. As mentioned earlier, Beck identifies risk society as emerging out of a modernisation of the industrial era. The crisis, he proposes, marks a transition between industrial society and the transnational and global society emerging in the 21st century. Joost van Loon agrees: "This crisis, it could be argued, is the transition period between industrial modernity and something else. The

interregnum is referred to as the (world) risk society" (*Risk and Technological Culture* 21).

Beck further suggests that the crisis enabled by risk society emerged in part due to the fact that institutions in industrial society have not been developed to handle the distribution of invisible goods and "bads"—what he relates to hazards and risks ("Risk Society and the Provident State"). The shift in perspective from a concern for the distribution of goods to its negative twin, the potential lack of flow, has given rise to a crisis of institutional organization and production (Beck, Van Loon).

The attempt to contain microbes and viruses exposes the climate of risk. Van Loon suggests that by exploring the use and application of biomedia through microbiological and biotechnological tools today, a better understanding of how risk culture functions may be had. Bioremediale images, such as those created as part of the *Living Viral Tattoos* project may expose tensions and constraints circulating in a risk society that aim to control uncertainties and phase changes emerging across the human, micro and planetary scales of life. I argue that by reflecting on the bioremediale image, a reconsideration of the role and status of unnatural participations between humans and non-humans in the global world society is facilitated. The role of biotechnology in relation to artistic, social and political dimensions is also presented in their complex perspectives. The bioremediale image that may provoke misunderstanding or misreading in one context, such as the installation at the Ormeau Baths Gallery, may on the other hand offer another reading that places the crisis of viral epidemics and bodily integrity at the micro and social scale in conversation with the industrial development of materials contributing to

the exploitation and devastation of global planetary ecologies. As van Loon astutely observes below, the emergence of global concern around viral epidemics must be placed in relation to industrial development and global ecological exploitation. He suggests that a viral epidemic

> coincides with global political, economic, social and cultural developments that may signify an 'end' of industrial modernity and its socio-political anchorage in the nation-state. Above all, [viruses'] emergence cannot be disassociated from a more generic global ecological crisis, as the hot zones of epidemic outbreaks are often the same marginal zones of industrial development and ecological exploitation. (*Risk and Technological Culture* 145)

The fear of unnatural participation between human bodies and microbes in the form of infection may often overshadow the ecological impact in which epidemics participate. One of the organizers involved in the ISEA conference[38] made the astute observation that the reaction from the gallery directors and their concerns around the perceived risk of infection may have stirred memories from the bovine spongiform encephalopathy (BSE) outbreak and the severe impact on the beef and agriculture industry in Great Britain and Northern Ireland between 1988-1998 (Ferguson *et. al.*). This connection is warranted. The implication of the industrialization of traditional farming and agricultural practices in Northern Ireland, and the use of antibiotics and more cost effective

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[38] I thank conference organizer Kerstin Mey for bringing this to my attention during the panel discussion "Is the (Art) World Ready for Bioart?" held as part of the ISEA 2009 conference in Belfast, Ireland.

grains— practices of mono agricultural production—expanded much needed industrial output, employment and economic wealth development. But the epidemic that developed and the quarantine placed on the industry crippled the country and saw the death of hundreds of thousands of cows across Great Britain and Northern Ireland. Bioremediale images such as the *Living Viral Tattoos* may be capable of remediating contexts; in this case, reminding the art gallery directors and organizers of the interconnection of ecology, epidemiology, art and unnatural participations. The relation between microbes, humans and the global ecological crisis is a key concern.

As I have mentioned throughout this text, bioremediale images such as *Living Viral Tattoos* have a large role to play within and beyond the contemporary art frame. As we move through an era of crisis and uncertainty with the emergence of superbugs, global climate change, and global economic uncertainty and transition, generating opportunities to read and experience bioremediale images in a global society and world stage (across all forms of social endeavor) and nation states is more important than ever. Beck reminds us that a fundamental problem of the 21st century is a clash of risk cultures in a contracting world of globalization (*World At Risk* 12). Various nation states, for example, engage in the staging of world risk with singular and varying strategies. Ireland has a specific relationship to risk and biomedia given the history of Mad Cow Disease (noted earlier) and as such the *Living Viral Tattoos* was perceived as a threat. In Canada today, for example, another risk culture is emerging around environmental science and art research that challenges the exploitation of oil resources. Franke James, a Canadian illustrator and activist critical of the oil sands in Alberta, had her funding revoked once the Harper government learned that she would be exhibiting her work concerning the environmental

hazards of fracking in the Alberta oil sands in an art show in Croatia.[39] Canada, for example, has disengaged with the staging of world risk around climate change, reneging on the Kyoto Accord. The current Harper government has made severe cuts to scientific research centres and project funding, creating a climate of concern among scientists and public interest groups around the perceived muzzling of scientists whose research findings may call attention to environmental hazards and risks around the exploitation of natural resources. [40]

These examples illuminate various expressions of crisis and risk culture in risk society today where the exploration of scientific and artistic research, necessary for coming to terms with bioremediale images such as the *Living Viral Tattoos*, are underrepresented.

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[39] See Suzanne Goldenberg's article for the *Guardian* (May 17, 2013) on the story, contextualizing the artist's work within the current debate of climate change and the Harper government move away from the Kyoto Accord. http://www.theguardian.com/environment/2013/may/17/artist-inspiration-canada-silence-climate

[40] For more information on the current concerns, The fifth Fifth Estate has produced a tTV elevision show titles titled "Silence of the Labs", which aired on CBC January 2014, which does in and contained an in-depth overview of the concern around muzzling of scientists and closure of science research centres in Canada. http://www.cbc.ca/fifth/episodes/2013-2014/the-silence-of-the-labs A list of closed science research centres in Canada can be found at http://www.cbc.ca/fifth/blog

VI. CONCLUSION

I have proposed that what occurred with the cancellation of the exhibition of the *Living Viral Tattoos* during ISEA 2009 is in part due to the tendency for contemporary risk society, and citizens acting within it, to preempt risk of infection, sometimes in situations that may not warrant it. Bioremediale images may provoke multiple layers of readings and discomfort for citizens and governing bodies, sometimes exposing deeply felt societal fears around unnatural participations. This is in line with an ecosophy and ethico-aesthetic engagement that insists on facing violence and uncertainties embedded in life and liveliness.

The role of unnatural participations is particularly fruitful in this discussion. Imperceptible life traverses scales from the nanomolecular scale to the global planet and as such, it is necessary to consider the multiplicity of relations via the image. The bioremediale image, in this case, can be seen to reveal this through the evocation of H1N1, the BSE outbreak, and agricultural, economic and ecological concerns. This attention to the relation between the ecological and living materiality of the bioremediale image is explored further in the next chapter. This concluding chapter proposes that unnatural participations between humans and non-humans may facilitate new readings of life across disciplines. Reconsidering the status of materials and life in the process of research production activities, not just in the reading of the images they produce, is proposed as an alternative mode of knowledge creation. The ecological implications of working with biomedia and bioremediale images both within and outside of the lab and studio are posited as a key concern to be explored in the 21st century.

CONCLUSION

> "Contemporary truth regimes continue to privilege vision—not the vision of the unaided eye but technologically mediated vision at the molecular level." (Gerlach et al., *Becoming Bio-subjects* 18)

I. EMERGING BIOSUBJECTS

The increasing use of biomedia and bioimaging technologies to convey knowledge and truth sets in both science and everyday life requires an engagement with images via an interdisciplinary point of view. Visioning techniques used to explore life are not only representing what and how humans know life, they are, in some cases, generative of liveliness, as explored through the example of the bioremediale images created as part of the *Living Viral Tattoos* research-creation project. Bioremediality is a concept I propose to consider how visioning techniques in the life sciences, particularly tissue culture engineering, can "speak" to artistic media and literacy points of view. To engage in such a perspective the bioremediale image is key. Not only is the image document in need of consideration, but the modes and methods of material production are integral. The mediation of materials (in all their forms such as method, process, applied materials, context) and the ecosophical implications, I am suggesting, must be considered.

The dominance of visualization practices in technoscience to objectify life is documented in feminist and cultural studies literature (e. g. Sawchuk and, Marchessault, Evelyn Fox Keller). The tendency of the technoscientific gaze to

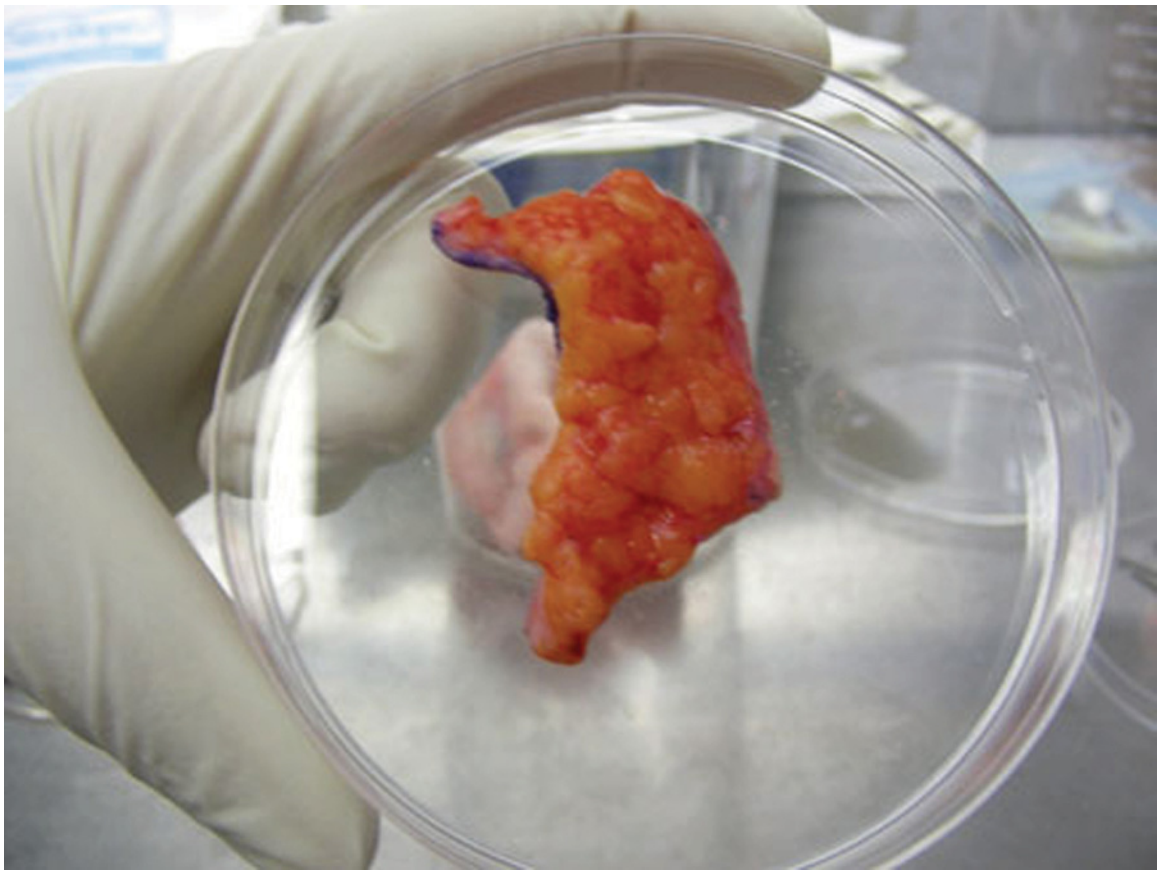

Fig. 23: Image of donated explant tissue
Photograph credits: Tagny Duff and Maria Grade Godinho (2008)

objectify and anthropomophize its subject through the lens of imaging devices is noted in Chapter 1 (i. e. as seen via the Canti method and microscopy timelapse). The technoscientific gaze continues to privilege vision in the post-biological age, where non-human microscopic and molecular scales of life are not just objects but are becoming biosubjects under the frame of law. The recent case of Henrietta Lacks' family seeking to control rights to the distribution of data collected from the HeLa genome reflects this shift in the move from cellular tissue as research material to biosubject (Callaway). The immortalized cell line created from the cancerous cells taken from Henrietta Lacks' body during her fight with cervical cancer, without her knowledge or consent and

before her death in 1951, has been used in research laboratories around the world. When the Lacks family learned how the cells were being used in research, there were concerns for the privacy of the family's medical history and for the dignity of Henrietta's body and identity.

The visualization of the human genome via DNA charts, diagrams, code and other modes of documentation arguably bring into being the biosubject, as exemplified by the case of the HeLa cell line. This is what Groys argues with regard to documents like ID tags, passports, birth certificates and DNA, etc. that generate a lifespan. The imaging practices previously understood to represent life are now, as I and others argue, generating life and liveliness and simultaneously creating new biosubjects that exceed the conventional notions of life and lifespan. For example, as Gerlach et al. observe, the process of seeing and representing life may be understood as an act of creation:

> A privileged set of apprehension techniques is emerging, all indebted to visioning. Increasingly, one recognizes one's self as a subject through practices of looking, watching and seeing.... From surveillance to screening to modeling, the capacity to see, and then represent, has ceased to be merely representational and has become an act of creation. (17)

By focusing on the "act of creation" via image production, not just as representation, but as a generation of life and liveliness, we can unveil the bioremediale image as a performing biosubject that "...respects no borders and recognizes no status in its interactions with humans as differentially positioned

biosubjects" (Gerlach et al. 187) In the case of the *Living Viral Tattoos* sculptures, the imperceptible viral vectors with the red fluorescent protein (jellyfish gene) are the imaging agents used to deliver the gene for expression, thereby creating the status of the gene transfer, not just representing it. The synthetic viral vector (encased in Human HaCat cells in this case) is an exemplary biosubject for the 21st century, as it suggests or promises that such biosubjects can be controlled and tamed by humans. In most cases synthetic viruses are tamed wild viruses as their pathogenic material has been omitted. However, there are cases where such viral vectors may recombine to "go wild" and revert to the wild HIV status. Such chimeras are generated in the laboratory due to contamination, user error, and other environmental factors—to the extent that some have called for some cell culture lines (such as the McCoy and HeLa cell line) to be listed as a new taxonomy of life. The cross-pollination and contamination of microbes and human, genetically modified or otherwise, is particularly suspect as a risk in a global risk-focused society.

II. BIOREMEDIATING BIOREMEDIALE IMAGES

When working in the science, art or computer laboratory or studio to produce images, one is automatically faced with the prospect of contamination. If I spill coffee on the computer keyboard, will it negatively impact the electronics and might it attract bacteria? Will the paint or epoxy fumes I am creating in the studio contaminate the air quality and create possible health risk? When entering the science laboratory focused on cell culture or microbiology, the challenge is to find a delicate balance between fostering a supportive growth environment for the microbial life required for research and preventing microbial contamination of specimens. Aseptic technique created in response to germ theory is a staple practice in the science laboratory environment. The

creation of this sterile laboratory ecology produces immense amounts of waste production. The focus is often on the risk for humans working with various specimens, and as such a vast set of laboratory safety protocols are generated and enforced. Artists working in official science laboratories are subject to the same regulations as scientists. The use and manipulation of microbial life forms for art and science (or art-sci) are subject to particular scrutiny by policy makers, public interest groups and institutional forces, particularly because of the risk culture with which it engages. Discussions on the role of materiality and material objects applied in biological research and art-making is arguably overshadowed with the current preoccupation on risk culture. Expanding the lens of "lifeness" and recognizing the interconnectedness of laboratory materials inclusive of plastics, chemicals, and energy with specimens and lifeforms both in the lab and among extended networks outside of the lab is called for.

In the case of the *Living Viral Tattoos*, the materials and matter used in the design of research devices used to grow the cell culture and sustain the donated skin, such as plastic, chemicals, and metals embedded in the pipettes, flasks, and the imaging instruments themselves, are key agents in the creation of images. In particular, the disposal and displacement of contaminated waste and residual media created from research is understood to generate, just as it may disturb, ecologies for other lifeforms and lifesystems that are not perceived in the frame of research. For example, the contamination process in the lab may generate new cellular and microbial lifeforms, the incineration process inputs waste into the atmosphere that creates changes to bird migratory patterns, air quality, and the planetary ozone layer. Lead and mercury from the metals used in laboratory research may run into landfill and waterways impacting fisheries, flora, wildlife, and urban human populations.

The waste systems used for disposable materials in both artistic and scientific labs are intended to close and contain the loop of waste excess through networks of recycling and waste management. However, such systems intended to prevent waste leakage may facilitate faster systems of recycling and waste disposal—thereby creating more waste. As van Loon notes,

> In its attempt to enclose all waste circulation into a singular flow under continuous acceleration, waste management generates an environment that is internal to itself. The fixation of waste in a metaphysics of presence is always a matter of mapping it between the 'not-yet' (its emergence) and the 'no-longer' (its disappearance). Waste is thus always displaced to another time-frame. Shortening the interval between the two might lead to a dissolution of waste from the present/presence, it cannot stop it from returning. (*Risk and Technological Culture* 122)

The bioremediale image and bioremediality operate within these displaced time-frames and durations.

The bioremediale image, by the fact of its liveliness, implicitly evokes the fallacy of inert byproduct creation. The materials used and processes undergone to create images exceed the waste management systems that profess to contain them. The image exceeds risk management systems as its production and creation fall out of the frame and through waste containment systems that do not eliminate life and liveness, but rather, facilitate and transform other lively ecologies like bacteria, yeast culture, fungi, biochemical traces and carbon emissions.

At this juncture, the relations between the bioremediale image and bioremediation in their scientific, artistic, and philosophical contexts overlap. I suggest that the bioremediale image, such as the *Living Viral Tattoos*, must be considered in relation to its own waste relations and ecologies. As outlined earlier in the introduction, the concept "bioremediality" extends its reference from "remediation" of media (Bolter and Grusin) to the scientific notion of "bioremediation" to expand the notion of ecology and the image. Bioremediation is a scientific field and practice that recognizes the ongoing exchange and generative potential between carbon matter and cellular metabolism co-existing in polluted environments. The introduction of microbial life forms to toxic landfill, for example, has assisted in the removal of chemical spills, and the reinvigoration of forests affected by deforestation. The ongoing cycle of metabolic, biochemical and carbon generation in waste removal is explicit in this mode of waste management, and it is a perspective that may be applied in the very mode of producing images in the science, computer laboratory or studio.

This shift from recycling to bioremediating images and the materials used in their production and creation is a substantial one. It suggests that non-human carbon-based images have an integral relation to metabolic systems outside the frame via waste systems and modes of production. It calls for a rethinking of human relations to technologies, tools and devices used in the creation of images. It requires a broader knowledge of science, engineering and art to understand the limits and constraints of the materials, processes and devices used in image production today.

Bioremediation also calls attention to how and what is considered material and media for remediation. This is a key area of intersection between the sciences and arts and design, such as research into new bioplastics and polymers that consider the impact on ecosystems and waste cycles. Given the growing rate of mercury from discarded computer and cell phone hardware, of plastics and needles from biomedical research, of paint, and the rise of negative health effects from hormone disruptors in plastics in land fills and water systems, this is a timely focus and one that requires more research.

III. ENGAGING RESEARCH ACROSS FIELDS OF KNOWLEDGE

The *Living Viral Tattoos* sculptures and video documentary continue to be exhibited and written about by researchers in the field, in part due to the complexity of their biomateriality and their rigour of interdisciplinary praxis. The work illuminates current tensions around "reading" of biological art-based work employing scientific technique as a strategy for critique and reflection in the public sphere. The concerns I have addressed in this text have emerged through and from the research-creation project. The *Living Viral Tattoo* sculpture, video, installation "sketches" and photographic works can also be "read" and experienced on their own terms. I have framed the concept of bioremediality and the bioremediale image through the project after having created the works and witnessing the project grow and expand in the public milieu. When working with slow media, one requires a longer time to process the implications of such work and to develop a scholarly vocabulary around it.

Speaking and writing on the *Living Viral Tattoos* is a project in and of itself. One of the common criticisms that comes up with this research project and the ones I continue to engage in is that I am too scientific or, in the case of the

sciences, not scientific enough. I have learned to speak differently to different audiences, each with their own aptitude and interest in artistic or scientific perspectives. My hope is that these ideas and the project developed here may be a bridge across the various cultures. The concept of the bioremediale image intentionally aims to bypass any tendency to situate the work within a genre or field of bioart or biological arts. The bioremediale image potentially implicates all fields of knowledge, albeit with the *Living Viral Tattoos* I am focused on a more humble aim of talking to the fields of media art, performance and the life sciences.

There is an urgency for the fields of media art, performace and life sciences to speak to each other and share knowledge sets around imaging practices. The rapid growth in the field of the life sciences, particularly biotechnology, has huge repercussions on how we, as humans live, perceive and create life. Biotechnology and biomedia impacts human livehood from food and agricultural practices, assisted reproduction technologies, to biometric surveillance technologies, and yet, often non-specialists in the fields are unaware of the science behind the technology. Images and articles written in specialised language may exceed the non-specialists ability to "read" the content. Given the tremendous technological shifts occurring in the life sciences and the advance of imaging processes and devices from the nano-to universal scales of life, it is necessary to increase the literacy of media and conceptual frameworks to a larger constituency: both human and non-human. The emergence of a global risk society is a symptom of the uncertainties and anxieties generated as part of a global shift from the industrial era to something unknown. Images have a large role to play in illuminating, generating and affecting this shift, and as such they must be considered as participants with

agency in a networked ecology of global communication systems and knowledge creation.

Currently, scholars in the academic arena acknowledge the necessity and benefits of sharing research in "layperson" terms so that non-specialists may engage in the knowledge. This is a step towards encouraging interdisciplinary research, however, I have found such modes of engagement often to be within a disciplinary field. For example, there is exciting interdisciplinary work conducted in the biological sciences, that integrate neuropsychology, molecular biology, and environmental science. The media arts is similarly seeing a convergence of once disparate fields like performance,video, computational arts, painting, sculpture, and biological art. The challenge is how these subfields with disciplines can exchange, "read" and participate in a range of knowledge sets. The image is a common link and form of literacy across all these fields. Images are fundamentally important as the written word in research and knowledge creation/dissemination. Yet, simultaneously, the use, implication and consideration of visual imagery, while I have argued is the privileged human perceptual mode, is undervalued in relation to the textual forms of "official" knowledge distribution systems such as academic and governmental documents.

The concept of bioremediality, as seen in the research-creation project *Living Viral Tattoos*, reconsiders liveliness at a time of uncertainty, growing importance of biomedia and global risk culture. This reflection is intended for a range of participants and audiences from those within academic, industry, the growing DIY bio and citizen science movement- to the general non-specialist. This dissertation text, with its academic language and inserted image

documentation from the research generates and relays the reading of the *Living Viral Tattoos* to a specific reader. It is a very different form of engagement than the encounters one might have with the sculptures, the video or the photographic images in a gallery setting or online. This multi-modular range of bioremediale images "speak" to both the specialists and non-specialist. They generate a liveliness that will have moved through the electronic pulse of the screen, chemical-based preservation liquid, cellular tissues, landfill, microbial ecosystems and molecular networks long after this last sentence is read.

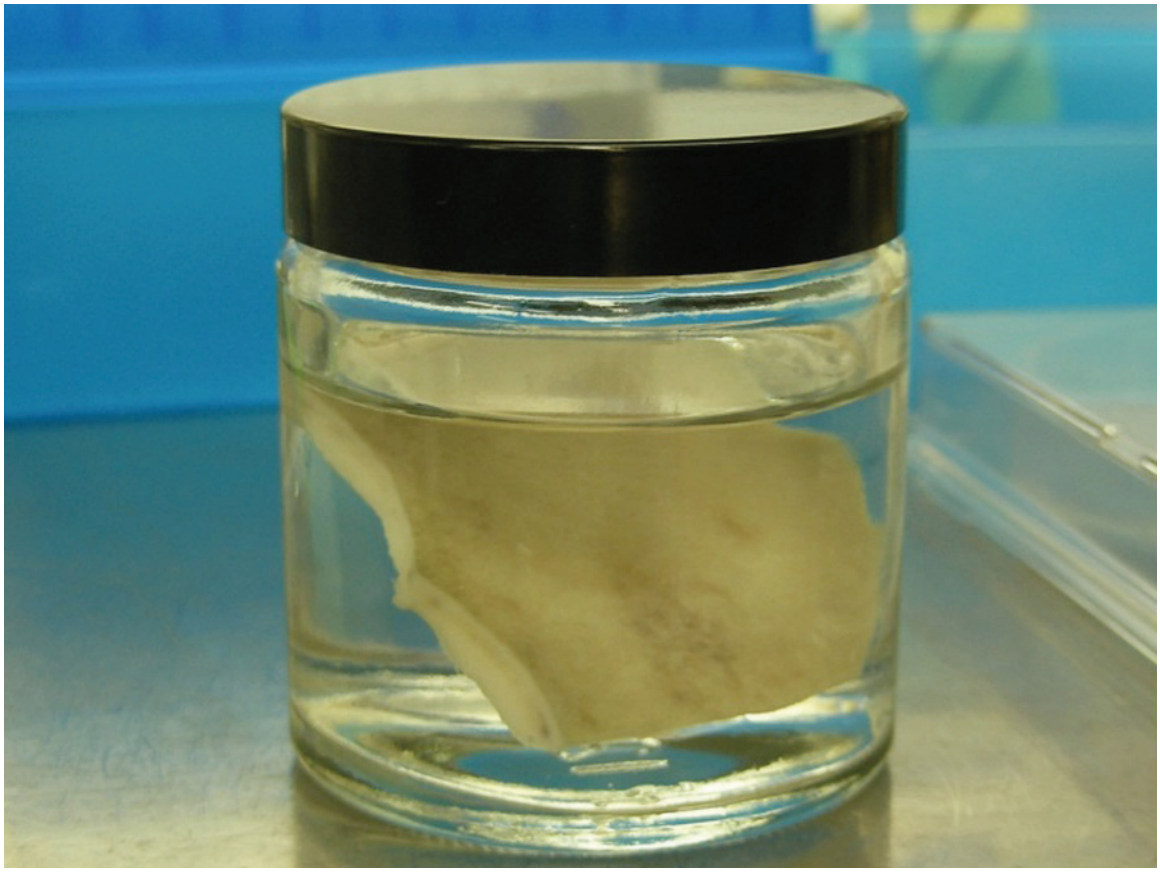

Fig. 24: *Living Viral Tattoos* (2008)
Photograph credit: Tagny Duff

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APPENDICES

APPENDIX 1

Duff, T. Muhling J.,Godinho M. and Hodgetts, S. “How to Make Living Viral Tattoos”.Transactions. *Leonardo: the International Society for the Arts, Sciences and Technology.* Vol. 44, No.2, MIT Press, April (2011): 164-165. Print.

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How to Make Living Viral Tattoos

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Abstract

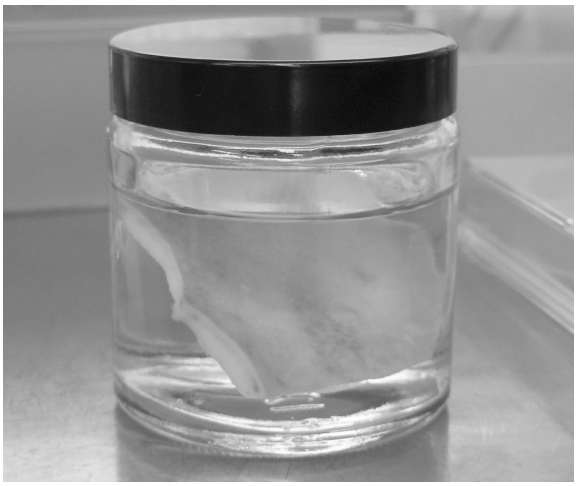
Living Viral Tattoos (2008) is a research-creation project featuring the development of sculptures made in vitro. The creation of tattoos in the form of blue 'bruises' on pig skin and donated human skin was made using retroviruses, cell and tissue culture and immunohistochemical stains. This technical paper presents the protocols created and materials used in the project with the intention of contributing to an open source model for the development of wetware and biological art processes. Keywords: Biological art, viral media, tissue culture, collaboration, open source, interdisciplinary.

Today, synthetic retroviruses, such as Lentivirus, are regularly used in laboratories to transport genes and markers to various 'target' areas and immuno stains are used to visualize viral and cellular reactions. Living Viral Tattoos is a research-creation project featuring the same process of immunohistochemical staining to visualize infected cells on the surface of human and pig skin and render a blue 'bruise' that is perceptible to the human eye. Conceptually, the idea of using the movement of virus to create the 'bruise' is the focus of artistic expression rather than delivering a gene of interest for scrutiny. The rendering of the 'bruise' is not scientific or medical. No contusion has occurred on the skin. Rather, the stain rendered in the form of a bruise is a reference to current tensions and social anxiety regarding biotechnology and the viral. My intention in using Lentivirus as an artistic medium and subject is to explore how perceptions and tensions around infection and contagion might be re-imagined and rearticulated by engaging with viral vectors. [1]

This project and technical paper is a cross-collaboration between myself, Dr. Stuart Hodgetts, Maria Grade Godinho and Dr. Jill Muhling. Given the interdisciplinary nature of the project where techniques and technical terminology from the life sciences may be less familiar to the arts and humanities, just as artistic processes are less familiar to the sciences, an open source ethic and sharing of technical development is necessary. This article outlines how scientific techniques, such as tissue culture engineering, the transduction of viral vectors and immunohistochemical staining on skin are used for the creation of sculptures.

The language and format used in this text is a hybrid of an artist project statement and science paper. The scientific terminology used to describe the artistic linguistic expression and material application, just as my use of the first person and the basic premise of the science technique described here may not meet the standards of a science journal. [2] In doing so, this text intentionally explores the convergence of our various knowledge sets as artists and scientists collaboratively applied towards the making of Living Viral Tattoos (2008). [3]

Fig. 1. Living Viral Tattoos (2008) A research-creation project and series of sculptures. Tagny Duff in collaboration with Dr.Ionat Zurr, Maria Grade Godinho, Dr. Jill Muhling, Oron Catts and Dr. Stuart Hodgetts. Materials: Human and pig skin, HaCat Cells, Myoblasts, Lentivirus, Red Fluorescent Protein, immunohistochemical stains. Photo: Tagny Duff.



Preparing pig and human tissue for transfection

The first series of sculptures depicting the 'bruise' on the surface of skin was created on pigskin bought from a local butcher. After ethics and biosafety approval was received from Concordia University and The University of Western Australia, I met with a plastic surgeon and made arrangements to seek the donation of skin from a consenting patient undergoing elective surgery for breast reduction. The skin was collected from the hospital immediately after the surgery was completed, and delivered to the lab. Both human and pig skins were cut into smaller pieces, placed in four-well petri dishes and washed with phosphate buffered saline (PBS) in preparation for transfection with the Lentiviral vector.

Lentiviral transduction

The transfection of the skin consisted of many steps that occurred over a ten month period of planning, organizing and application. Early on in the process I purchased two frozen vials of custom made infectious, non-replicative Lentivirus (Bio-Genova) and had these mail ordered from a biotech company in the USA. The Lentivirus was genetically modified to express red fluorescent protein (RFP) and titred at $1x10^7$ transducing particles/mL. Both vials were thawed and each of the 200 microliters (μl) of viral supernatant aliquoted at $1x10^4$ into microcentrifuge tubes before freezing in storage at -80°C. I worked in the lab at SymbioticA where I grew human endothelial HaCat cells and murine primary myoblasts from skeletal muscle with the direction of Dr.Ionat Zurr and Dr. Stuart Hodgetts and additional help by Guy Ben-Ary. Once the Lentivirus arrived and all elements for the transfection process were organized, I plated the cells in 24-well dishes overnight with DMEM nutrient solution and 10% (v/v) Fetal Bovine Serum. When the cells were 60 percent confluent, the Lentivirus was thawed and 10μl was added to each cell type to test the multiplicity of infection (MOI). The next day, medium was removed and replaced with

fresh medium, then incubated again for twelve hours. The cells were washed in PBS, and trypsinized in 0.25% (w/v) trypsin/10mM EDTA. (Trypsin is an enzyme for lifting the cells from the plates and suspending them, so that the cells may be passaged). At that point, I resuspended the viral host cells in more media and then transplanted them onto the skin substrate.

Fixing and staining sculptures

While all of us had direct input into technical production of this project, it was Dr. Stuart Hodgetts who modified the immunohistochemical staining protocol to render the areas where the lentiviral-transduced cells had transfected the 'host' skin [4]. In this process, cells are fixed so that enzyme reactions can be observed in the form of colour coding (using a chromagen).

A number of steps were taken to fix and stain the sculptures. First of all, the suspended viral host cells were pipetted and transplanted directly onto sections of skin tissue and incubated for four hours. In order to render the bruise, a fixative was first added to the tissue to produce cell death and (in theory) neutralize the viral movement. Proteins and secondary structures (including nucleic acids ie. RNA, DNA) found in the tissue were crosslinked by the fixative, and antigens "revealed" for binding to antibodies. The tissue was fixed with 1:1 (v/v) acetone: methanol for 5 minutes then incubated with primary antibodies (used to locate the antigen of interest) for 30 minutes at 37 degrees C. The tissue was then rinsed three times with PBS to remove unbound antibody and incubated with secondary antibodies (ImmunoPure Goat Anti-Rabbit Peroxidase Conjugated and ImmunoPure Peroxidase Conjugated Goat Anti-mouse, which are specific for the primary antibodies) for 30 minutes at the same temperature. A rinse with L-15 was performed three times, with another series of PBS washes. After antigen:antibody reactivity a chromagen solution was applied to the tissue. The blue staining that co-localises with the applied virus was achieved using 4-chloro-1-naphthol (4CN) chromagen solution. The colour blue was produced wherever the transfected cells proliferated in or on the dermal layers of skin. The extent of blue colour depicting a 'bruise' was enhanced to the desired intensity by submerging the tissue in tap water for two days to intensify the 4CN staining.

After the staining process was completed one piece of transfect and transgenic human and pig skin, respectively, were put into a small glass jar filled with paraformaldehyde. A total of eight skin sections

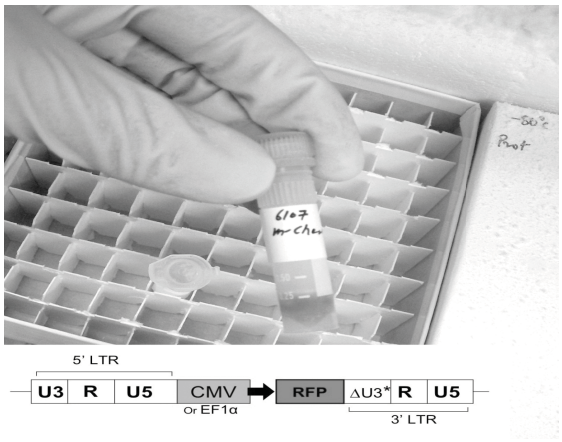


Fig.2. Photo: Tagny Duff. Image and diagram of frozen Lentivirus with Red Fluorescent Protein

are displayed in four specimen jars. The sculptures have since been relocated in new glass containers containing PBS and are currently displayed at SymbioticA and the School for Anatomy and Human Biology at the University of Western Australia.

Conclusion

The overview of the technical development of Living Viral Tattoos is intended for open source sharing and distribution. Biological art processes and wetware are emerging in new artistic practices and interdisciplinary research. This short text intends to contribute to an expanded understanding of some key methods, technologies and terminology used towards these ends. It may also be seen as a tactic for scoring the document so that it may be repeated and remixed by other interested practitioners and researchers. [5]

Our collaborative work reflects recent negotiations that are occurring between artists and scientists. At points, this text lends itself to technical scientific language. If the artistic use and theoretical and conceptual discourses around wet ware and biotechnology are to evolve in the arts and humanities, it is necessary to grasp both the scientific processes and terminology. Other sections are vague and personalized. Researchers in the applied life sciences are implicated in the development of art and biotechnology by having to learn 'art speak'. The cross pollination creates a hybridity that does not settle comfortably in one discipline or the other. However, borrowing terminology from the life sciences, the 'hybrid vigour' may well be advantageous for both fields of research.

References and Notes

1. A longer exploration of the artistic, conceptual and philosophical implications of this project is forthcoming in the PhD dissertation by Tagny Duff entitled *Moist Media Documents: Viral contagion from performance to documentation*.

2. "People in the humanities, for their part, tend to take a piecemeal approach to application. They will isolate an attractive scientific or mathematical concept and add it to the repertoire of their own disciplinary system, like an exotic pet. Scientists might rightly object that the concept has ceased to have anything remotely scientific about it and is just functioning as a metaphor." Massumi, Brian. *Parables For the Virtual. Movement, Affect and Sensation.* (Durham; Duke University Press. 2002). Pp 19. Scientists, on the other hand, are aware of the need to borrow from methodology and practice in the humanities to expand the accessibility to scientific research and publication. See 'How to Write Consistently Boring Scientific Literature' by Kaj Sand-Jsen and may be found at; .<http://www.indiana.edu/~halllab/GradRes/BoringWriting.pdf>

3. The research-creation project, part of a PhD dissertation undertaken by Tagny Duff at Concordia University was produced with the collaborative efforts of Tagny Duff, Dr. Ionat Zurr, Dr. Jill Muhling, Maria Grade Godinho and Dr. Stuart Hodgetts. The PhD research is supervised by Dr.Erin Manning and the lab work by Dr. Ionat Zurr. This research was done at SymbioticA, The Centre For Excellence in Biological Arts in the School of Anatomy and Human Biology at the University of Western Australia between 2007 and 2008. The research was funded by The Social Sciences and Humanities Research Council of Canada and the Fonds de recherche sur la société et la culture. Human ethics and biosafety approval for this research was obtained through UWA and Concordia University.

4.This protocol was developed by Dr.Stuart Hodgetts. The full protocol and its ongoing developing can be found at; <http://cryobookarchives.wordpress.com>

5. For more thoughts on this read MacDonald, Corina. Scoring the Work: Documenting Practice and Performance in Variable Media Art. *Leonardo*. 42, No. 1, (February 2009) pp.59-63.

APPENDIX 2

Duff, Tagny. "Living Viral Tattoos? Crisis Alert!", *Total Art Journal*. University of Western. Vol. 1, No.1 summer (2011); 1-9. Web.

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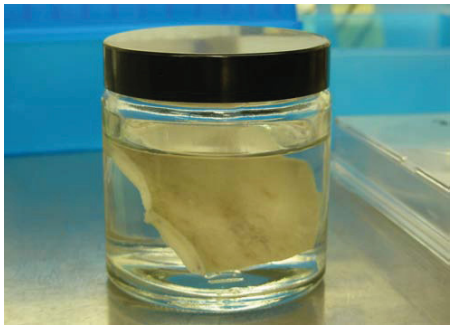
Total Art Journal • Volume 1. No. 1 • Summer 2011

LIVING VIRAL TATTOOS? CRISIS ALERT![1]

TAGNY DUFF



Left: *Transfection on human explant tissue*: *work in progress towards the making of Living Viral Tattoos*,
Right: *Living Viral Tattoos*. Materials: Human and pig skin, Lentivirus and HaCat cells.
Image Credits: Maria Grade Godinho and Tagny Duff.

When we humans walk in a city, run through the halls of a busy airport, roll through a bus terminal or a train station, we are traveling through not only streets, hallways and stairs, but through microbes. Viruses, bacteria, yeast float in air, in walls, in moving human bodies. We move these microbes, just as they move us. The limitations of barriers and borders are not clear, if they exist at all. We move with an interkingdom of unnatural participations.[2]

Unnatural participations occur when nature acts against itself. Epidemics, contagious diseases, strange

[1] Acknowledgements: The author would like to thank the organizers and colleagues who participated in the roundtable discussion "Crisis Response" held September 2009 through the Department of Communication Studies at Concordia University. The lively debate contributed much to the development of this paper. The author further thanks the ISEA (2009) organizers for hosting a plenary panel discussion on the *Living Viral Tattoos* work.

[2] I am borrowing from the terms explored in Gilles Deleuze and Felix Guattari, A Thousand Plateaus: Capitalism and Schizophrenia trans. Brian Massumi (Minneapolis: Minnesota UP, 1987). "Unnatural participations or nuptials are the true Nature spanning kingdoms of nature. Propagation by epidemic, by contagion, has nothing to do with filiation by heredity, even if the two themes intermingle and require each other" (241).

couplings and anomalous events modify assemblages. The unnatural creates movement disturbing the order of things, classification systems and the equilibrium of filiation. Such movement roams through instability, the "what will have been."[3]

Humans exist in a precarious relationship with the microscopic interkingdom. We try to defend our bodies against attack from unnatural co-minglings. We try to maintain an equilibrium. Germs are "disinfected." Aseptic technique destroys all potential contaminants. Humans constrict border passages to control the flow of bodies, successfully or unsuccessfully controlling the growth of microbial populations to maintain the equilibrium of the human population. This creates new forms and conditions such as "super bugs," new strains of infectious diseases, all contributing to the conditions of far-from equilibrium: crisis.

Crisis is an unstable status, a phase change, a turning point, a moment of change where the outcome is unknown, but perceived to have negative consequences. Crisis signals a major shift, both productive as growth and potentially destructive. In many ways, what humans perceive of as crisis, such as pandemic, may be productive of evolutionary growth of bacteria and microbial entities. The growth of bacteria may be catastrophic for the human population but is also a continuation of genetic modification of life forms on the planet, a process that has been ongoing for four billion years.

Crisis and Unnatural Participations

The crisis of humanity is articulated in multiple narratives of catastrophe. One such narrative reoccurring in the 20th and 21st century is the story of alien invasion or the takeover of human life by robots and other cybernetic creatures of war. The fantasy of humans battling it out with machines only to end in catastrophic tragedy for the human race is still with us, but it is shifting. Popular films such as *The Terminator/Robocop* (1994), *Invasion of the Body Snatchers* (1959, 1993), *Metropolis* (1927) illustrate such narratives. The recent popular American television series *Battlestar Galactica* (2003-2009) reflects a change in attitude towards cyborg clones and machines. Relationships between humans and the cyborg clones (the Cylons), while fraught with antagonism, war and violence, are also implicated within complex and ambiguous moments of allegiance and love.

As humans gain more confidence and mastery with digital and electronic networks and gadgets, the idea of human-machine interminglings becomes more acceptable. The human is more at ease with electronic and digital vibrations, voices and faces that we now hold in our hands, our heads and our flesh, bones and blood with everything from iPods, PDAs, laptops, pacemakers, etc. The augmentation and merger between human and machine is no longer a serious threat, no longer a crisis.

The crisis has shifted to the unseen; the undead virus that moves through air, cellular matrix, unprotected data, and unprotected flesh. It is in the hidden cell of a terrorist network; the bacteria that mutates and exceeds the capacities of antibiotics; and the yeast that proliferates in the gut. The human, just as other animals, plants and microbes, is faced with the reality of sharing bodies; loose, wet and amorphous cells moving within the world. Given the openness of bodies to exchange materials, forces and relations, the affect of unnatural participations—so necessary to the ongoing movements and evolution of bodies—is for the most part, unknown. It is the unknown, these unseen co-minglings through the holes in bodies that generate both fascination and fear.

In 1890 Robert Koch published the four postulates establishing a method for evaluating causal relations

[3] By this I mean the potentiality and indeterminability of events.

between microbes and diseases. As a result a new technique isolating humans from microscopic pathogens was applied. Koch`s postulates proved the scientific validity of Germ Theory, establishing the currently held belief that microorganisms cause disease. Aseptic technique developed in the mid 20th century is now routinely used to kill unseen microbes and prevent infection. Such a practice attempts to prevent the crisis of fever, illness and death.

Insecurity around human capability to control the microcosm is the current preoccupation of global crisis. Viruses, more than other infectious microbes, are at the forefront of the crisis: be that of the so-called global economic crisis or the H1N1 pandemic.[4] Both crises, not coincidentally occurring simultaneously, reflect the deeply intertwined relation between bodily health and global economic health. Faster computer processing and newly developed bioinformatic technologies are applied to control and monitor the flow of bodies. Aseptic technique is replaced by thermal scanners at airports, CCTV systems, and GPS tracking devices. The increasing focus on prevention of pandemic and economic health preemptively assumes crisis and catastrophe. This generates a call for action and mobilization. Borders are strengthened, quarantine is enforced, and currency fluctuates. The expectation of the invasion of viruses and virulent microbes looms,[5] just as Y2K generated a hysterical expectation of the impending disaster of a global computer meltdown.

Viruses: the Unnatural Shapeshifters

The ability of viruses to wreak havoc in genomic structures, computer algorithms and health is on the forefront of global media news. They are shapeshifters in the sense that viruses move and create change through contagion. In the life sciences, viruses are not classified as lifeforms until they infect a host cell. There is much debate about the vitality of RNA and DNA strands, the molecular structure of viruses, as scientists now frequently construct synthetic viruses in the lab and use them to deliver genes to specific parts of cellular "targets." Viruses remind us that there is something more than the "code" of life based on the presupposition that life operates similarly to a computational algorithm, without falling into vitalist position that privileges cellular life above all else.

Synthetic biological viruses are, in fact, exemplary of living entities that challenge assumptions of life and liveness, provoking a reconsideration of the interrelation between digital and biological life and biodigital media. As Eugene Thacker argues, bioinformatics, the convergence of digital, biological and computational media, now exceeds the analog-digital divide.[6] The division between biological life and computational algorithms is not so clear with the proliferation of ubiquitous wireless networking and supercomputing. For example, synthetic viruses are custom-designed in DNA sequencing databases with computer software such as BLAST. The sequencing forms the recipe for recombining DNA plasmids. These plasmids are inserted into living cells and tissue, becoming “wet”-ware for gene therapy and other aspects of experimental laboratory and medical science. These viruses transgress the division between organic and artificial, living and dead, provoking questions around current cultural and symbolic

[4] In January 2010, the parliamentary assembly of the Council of Europe, made up of 47 countries that work to protect human rights, are holding a conference titled: Faked Pandemics: a threat to health. This debate considers the role of pharmaceutical companies and WHO officials in overstating the threat of H1N1.

[5] The WHO has likened the H1N1 viral epidemic to the Spanish influenza epidemic of 1918.

[6] Eugene Thacker, The Global Genome: Biotechnology, Politics and Culture (Cambridge: MIT Press, 2005).

associations with the viral and technology.[7]

Viruses are the remixers of human genetic variation, they are the creators of the human cellular mashup well before Web 2.0 emerged with such an ideal. They take from various cellular matrices and remix them. They transverse species under the appropriate circumstances. (They know no copyright or ownership of genes). Scientists estimate that up to eighty percent of the unknown human genome called junk DNA are viral entities that are not as of yet, understood and classified. In other words, viruses have as huge a role to play in the growth and development of life (and bodies) as they do in altering genetic material aiding in its destruction. They interact with circumstances and environments, responding to, as they generate forces of movement. Viruses have been remixing genes for billions of years with the collaboration of environmental forces, the impersonal growth of the planet and universe.

Microbes and synthetic cloned entities and chimeras co-mingle in bodies and the environment, as they do in laboratory science and the representation in visual media and popular culture. They are part of the technological assemblage.

As artists begin to apply knowledge and technology from the life sciences and microbiology, it is necessary to confront the fear of crisis and catastrophe currently circulating around the artistic presentation of unnatural participations, as it is in the global hype around viral pandemics.

The Artist Working with the Public Display of Unnatural Participations

The artist who works with life and art, biomedia or biological material cannot avoid engaging in this perception of crisis and disaster at this moment in time. The paranoia and fear around biological media is often mistakenly associated with bioterrorism.[8] The assumption that such biological materials are biohazardous, dangerous and difficult to handle can supercede the realities of public health and environmental risks. Ultimately, the concern for public safety and media controversy over the public display of such "unnatural participations" between lifeforms and materials, such as transgenic, synthetic, clones entities, may prevent the public display of such work, even if there is no such actual threat. The following case study explores such a situation.

Living Viral Tattoos

For the last three years I have worked with biological synthetic virus and human tissue as artistic material towards the production of various performances, videos, sculptures and installations. *Living Viral Tattoos* (2008) is a sculptural project that has raised many concerns around the nature of biological material and public safety as discussed previously in this text.

Living Viral Tattoos is a series of sculptures made of human and pig skin and biological synthetic virus. The sculptures were made *in vitro* in a science laboratory. The synthetic virus called Lentivirus, a derivative of HIV strain 1, was placed on donated human skin (waste tissue from surgery) so that transfection and

[7] This does not suggest that viruses transcend such division. Viral movement is situational and implicated by the environmental specificity of its host.

[8] The tendency to associate bioart with bioterrorism is discussed in "Bioparanoia and the Culture of Control," from Beatriz Da Costa and Kavita Philips, eds., *Tactical Biopolitics: Art, Activism and Technoscience* (Cambridge: MIT Press, 2008) 413-428.

contagion would occur at the cellular level. They were living sculptures for the duration of approximately five hours, before they were fixed (killed). Once the cells were no longer alive, a staining process was conducted to visualize antibody reactions to antigens created by cellular bonds. The areas on the skin that were transfected by the viral host cells then appeared bluish/brown. This scientific process was intentionally appropriated to visualize viral tattoos in the form of bruises. Once the visualization of color was completed, the sculptures were placed in jars of paraformaldehyde for a year and then moved into PBS.[9] The virus, cells and tissue are inert now and the biomaterial reveals areas of bluish brownish stains.

Theoretically speaking, the work is no longer living as a biological entity, as the tissue no longer has a metabolism. The sculptures pose no health risk. The metabolically inert material cannot replicate or infect. It is more sterile and less dangerous than a human cough. The sculptures are easily displayed on a shelf in a gallery, on the desktop in my office, in the display case of a science centre.

Yet, it is technically possible to consider these biologically dead cells and viruses *undead*. For example, we could take RNA or DNA samples from the tissue, find the structural pattern, and replicate the viral clone with recombinant DNA at a later point in time. The symbolic associations humans attach to preserved flesh also contributes to a suspended notion of liveness: a suspended mode of phase change that can be revitalized at a later time either through the image, the genetic or biological structural form.

The work speaks to the unnatural participations applied in biotechnology; particularly in tissue culture engineering of viruses, mammalian, plant and microbial bodies. Such co-minglings are productive of a continuing relation of movement across species, shifting the stability of temporal and spatial horizons. The couplings in this work are multiple: cross filiations not usually experienced in the material manifestation of art. Pig, human, HIV virus, cell lines, artist, scientist, plastic surgeon, art gallery, media festival, science laboratory, computer algorithms, biotech companies intermingle in unexpected assemblages that counteract filiation of genre, species and logic. A living viral tattoo? Not possible. Yet manifested. This strangeness triggers deeply held societal fears around the potential for these technologies to contribute to both regeneration of the body and extend its current lifespan and/or to create a catastrophic accident.

The Exhibition of Living Viral Tattoos as Crisis

In many cases, art works crossing into the threshold of the unnatural are prevented from entering the arena of reflection and discourse for fear of crisis. This is explored in the following situation that arose around the presentation and eventual cancellation of an art installation of *Living Viral Tattoos*. This work was selected by a jury for the International Symposium for Electronic Art (ISEA) in 2009 under the Posthumanism stream. After receiving a notice of this acceptance and proceeding with the necessary precautionary protocols for shipping and displaying the work, I was told that the work could not be exhibited. In an attempt to prevent an accident or public reaction around the work, the exhibition of *Living Viral Tattoos* was cancelled by the Ormeau Baths gallery in Belfast, and later by the organizers of the festival. This cancellation ironically made the work exemplary of the panel description of posthumanism, which is: "manifested through a range of biopolitical events, along with an aesthetic staging of bioethical encounters [that] ruptures the polarized views of bioconservatism and technoprogressivism, provoking a

[9] Phosphate buffered saline (PBS): a water based salt solution used in biological research (such as tissue culture engineering) to dilute and rinse cells.

series of conflicts that demand multi-layered conceptual apparatus to unravel."[10]

The cancellation of the *Living Viral Tattoos* illuminated the fluctuating views of bioconservatism seen in the reaction to the material manifestation of unnatural participations of viruses, human tissue and cells. It also reveals how technoprogressive ideologies that in theory support the exhibition of biosynthetic materials may be inadequate for practical matters such as providing necessary resources for exhibiting biological art works. In other words the rhetoric of the event supported theorizing the posthuman, while the concrete application of these questions—the use of biological material—is currently not supported. This concrete lack of support may be due to lack of resources, skills and interest necessary to accommodate such biological materials within an artistic context.

The details of the work's cancellation are noteworthy in that they exemplify the current state of such lack of resources and at times, irrational concern for public safety. Such reflections upon the process and details are useful and productive. The intention here is to consider how the cancellation of the work may be used as a case study for assisting in the exhibition of biological works in the future, and to contemplate some issues specific to biomateriality and bioflow in art today. This reflection acknowledges and recognizes the difficulties and tremendous personal efforts of the organizers to address these issues and concerns.

The main reason given for the cancellation of the work was the concern of introducing biohazardous materials into the gallery. Originally the sculptures were in low volumes of paraformaldehyde, which is a chemical substance classified as biohazardous, although it is frequently used for display of specimens in science museums. However, the organizers were notified on two separate occasions that the sculptures had been moved to phosphate buffered saline (a non-toxic solution) for the exhibition context, removing any kind of biohazardous material or substance. What resulted was a confusion about the meaning of biohazard as it is applied to biomedia and its display in an artistic context.

At the time the first cases of H1N1 had appeared in Northern Ireland and the UK, adding to the climate of uncertainty. The focus on transmission of contagion found in public service announcements, airport signage, and border crossing at the time added to the anxiety around biohazardous materials.[11] As Critical Art Ensemble wrote recently, "hyperstimulating the imaginary of individuals with fears of a loss of bodily integrity is one of capital's most common energizing spectacles."[12] Biohazard becomes synonymous with bioparanoia where all forms of biomaterial are suspect for transmitting dangerous substances, even when no reasonable threat exists.

The first sign of concern around the issue of biohazard occurred a month before the exhibition, when the board of the Ormeau Baths Gallery informed the festival organizers that the work would not be exhibited. I was told it was on the grounds of safety and insurance issues. When I offered to provide more information regarding the safety of the work, I was told not to contact the gallery.

To the credit of the ISEA organizers, they attempted to re-situate the work at the University of Ulster.

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[10] Quote is taken from the ISEA website, accessed September 2009, "ISEA: Inter-Society for the Electronic Arts," http://www.isea-web.org/eng/index.html.

[11] One of the organizers mentioned that it was important that we be culturally sensitive towards the Irish and the devastation of the mad cow disease (Bovine spongiform encephalopathy) on the agriculture industry. The wish to minimize the potential for accident, in this case an accident not possible to occur given the material and context, is expressed in such a concern.

[12] Critical Art Ensemble, "Bioparanoia and the Culture of Control," from Beatriz Da Costa and Kavita Philips, eds., *Tactical Biopolitics: Art, Activism and Technoscience* (Cambridge: MIT Press, 2008) 413-428.

However, this was not to be. The most glaring issue arose when the university researchers, having spoken to the UK Human Tissue Authority, were told that they needed a license to show the work which would take months to obtain. I immediately responded by telling the organizers that there was a mistake. The Human Tissue Act (covering the UK and Northern Ireland) states that licenses to publicly display human tissue are required for materials obtained from deceased human bodies only. The *Living Viral Tattoos* sculptures contain skin donated consensually from a living human donor with the expressed understanding that it would be used in an exhibition context. Therefore, the sculptures do not require a license under UK law. This was later confirmed by the tissue license officer.[13] Despite all this, with an invitation to show the work, the shipping arrangements confirmed, and a plane ticket about to be purchased, my participation in the show was cancelled.

The artist, scientist, and/or amateur enthusiast working with biomedia becomes the focus of debate, and responsible for all risk analysis. In this particular case, most of the preparation for the exhibition involved obtaining forms to legitimate the production and display of the work. Like other scientists and researchers, in order to make the work, I also had to pursue multiple streams of official ethical approval before the work could begin.[14] No matter how many ethics approvals, discussions and explications about the nature of the work; the focus returns to concern for safety. Will the audience be physically and emotionally safe? Will the donor of the tissue be protected? In a crisis-prone society, worst-case scenarios are the norm and every possible preparation to prevent accidents is in place. The reality is that despite the best of intentions and most thorough of preparations, the artist can insure and foresee only so much in relation to basic safety. For gallery directors, organizers, artists, administrators etc., to assume the entire responsibility for the safety of public audiences may censor the public's right to encounter the work. Is the audience not also partially responsible for their own participation and conduct within the exchange of ideas? The art world is not immune to the increasing scrutiny and surveillance of global bioflow, particularly because it is embedded within government, industry and private funding policies and economic agendas. As such, the art world (and those of us included in its orbit) wittingly and unwittingly enact preemptive security measures.

Towards Visions of Unnatural Participations

Despite the growing prevalence and striation of regulations upon bioflow across national borders, international travel routes and artistic venues, there is also an increased mobility across various strata. Humans with access to internet and telecommunications technology communicate through digital networks with greater ease than ever before. Bioflow navigates through the unnatural participation of biological and digital bodies. Such movement creates new configurations of shape, temperature, materials, speed, and scale often exceeding the striation of biocontrol.

The movement that occurs in the excess of biocontrol can be perceived as a worlding of human-animals, microorganisms and viruses where contagion is not crisis, not disaster; but desired, valued as a mode of intermingling. We do not have to look very far to see such worldings.

Transgenic, chimeric couplings can be seen in the paintings of Hieronymous Bosch. His paintings of

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[13] A member of the jury committee contacted the Human Tissue Authority to inquire about the issue and was given the contradictory information.

[14] The project received ethical approval from Human Ethics and Biosafety committees from both Concordia University and University of Western Australia. The process took approximately six months between submitting the applications and receiving approval to begin working on the project.

sexual and ecstatic unions across species are rendered mere years after the dark moments of the Black Plague (the Bubonic Plague). These works remind humans of the interconnection with forces of life beyond the human. Impure. Unholy unions. Fantastic and brutal. Within such interminglings contagion is a crisis that is lived and experienced. Although Bosch painted scenes to depict the evil perils of carnal desires such renderings reveal the worship of the haecceity of unnatural participations. These forces are embodied in the merger of non-human entities with the human-animal, chimeric beasts, and uncanny scales of bodies.

When poet William Burroughs spoke about the word as a virus, he meant that ideas produce strange couplings that break the stability of established ground. The past moves through the future. What has been written and thought can be contaminated, made impure and contagious. For Burroughs, this contagion is necessary in order to recreate what is known to the unknown. From this point of view the word is transgenic. It has shapeshifted through space-time across the page, through breath of mouths living and undead, in strange soundings that are no longer recognizable.

When performance artist Kira O'Reilly takes the corpse of a pig,[15] climbs inside it, strokes it, or sleeps with a living pig next to her naked body, she is creating an unnatural participation that can only be understood as caring for viruses, cells, blood and everything that is the pig. Becoming pig is embodied as a high form of unnatural participation.

When I grow and mix Lentivirus, RFP, with HaCat cells, human breast tissue, pig skin purchased from the butcher, I am willingly existing within an unnatural participation across species, organic, synthetic, living and undead entities. This is a frightening activity. This remixing of bodies implicates my own body as part of a technological assemblage that is not objective, contained or controlled. This is the hidden underbelly of science. Unnatural participations are the unspoken norm.

These strange materials and articulations that I find myself growing in an incubator, a sterile hood and an artistic context is the amplification of technological assemblages. The landscape of these co-minglings requires a shift in point of view. This is a necessary leap if the new assemblages of bodies across biodigital networks are to be thought, experienced and generated.

Imagine this scenario as a durational performance occurring across microscopic ecologies:

> Cells mate with bacteria and swim through the blood of pig and human. Colonies of bacteria proliferate and overtake the cells causing an explosive break and spill. Toxic waste streams through plasma while synthetic antibodies push down quickly through a metallic tunnel. X-rays illuminate the shape of bones creating pathways for migrating viral host cells. Buds multiply on the circumference of the porous surface of a cell and release. They float and attach themselves on the next cell, and insert a portion of their surface. They start to slow down. The temperature cools until they are frozen. The cells slowly move again. New cells circulate around them. The bacteria is gone. The plasma is cleaner, less cellular waste floods the channels. Human muscle cells collect with, pig, bird, and rabbit antibodies. The cells hold a gene from a firefly, chemical particles from battery acid, and mitochondria busily eating away at cellular debris.

This performance is occurring and will have occurred in most laboratories in universities, biotech companies, in some cases, the amateur scientist's basement. It will have been occurring in the

[15] From the performance Inthewrongplaceness by Kira O'Reilly (2005).

environment of the human-pig body across larger spans of time than accounted for in human history. Contagion moves these unnatural participations. Such movements are impersonal. This does not insinuate that, as humans, we cannot be moved by fear and crisis of contagion. From a certain point of view crisis is a reflection of necessary and desired phase change for health and evolution. From another, it is a human experience of illness, death, and poverty. All of these points of view are conjoined. The point here is to acknowledge the place of contagion and the viral as a rich intermingling of potential. It is also to acknowledge the tendency, at this juncture in time, to emphasize catastrophe and impending crisis for the human-animal and its technological assemblage with machines and microbes.

APPENDIX 3

Duff, Tagny. “Going Viral. Performance and documentation in the science laboratory” in Transplantations 14.4.*Performance Research Journal of Performing Arts.* Eds. Ric Allsopp & Phillip Warnell. Francis and Taylor. Vol 14, Issue 4, December (2009): 36-44. Print.

Going Viral
Live performance and documentation in the science laboratory

TAGNY DUFF

The PC2 lab is empty this evening and no-one is around working in the sterile laminar hoods except myself and Maria, a neurobiology researcher and PhD candidate. We have just arrived from the hospital where I picked up a container with human breast tissue that was removed from a patient who donated it after undergoing elective breast reduction surgery. I prepare the Petri dishes, pipette tips and other necessary materials for the transplantation of viral host cells onto human skin tissue. Maria watches and waits with the video camera.

How does one encounter live performance and documentation at the level of the cellular and molecular? Growing and transplanting cells in vitro is a practice that is being employed by artists with increasing frequency, and is recently becoming associated with performance and biological art (also referred to as bioart). In order to work with molecular and cellular bodies, artists are in the science laboratory, utilising it as a site-specific venue for performance events. Such events employ performance and documentation as mutually complementary practices, rather than as separate ones. Each practice is mutually reliant on the other to evoke a complex threshold of live encounters. I wish to propose that the interrelation between performance and documentation can be seen as viral.

The viral is explored through the performance and documentation of *Living Viral Tattoos* (2008), a performance research project featuring the transplantation of viral host cells onto human skin in vitro. I perceived of my work in the science lab, and the performance of the viral host cells as in situ/in vitro performance. The intention of the project was to visualise the transplantation of viral host cells through the creation of blue bruises on anonymously donated human ex-plant skin. The manifestation of bruises through transplantation of viral host cells reflects on the potential of current biotechnologies to manipulate and construct live events (and bodies) through harnessing viruses and their affective forces.

THRESHOLD OF LIVENESS

Today, performance events at the human and cellular level occurring in the lab are generally witnessed and performed solely for and by scientists, students of science, invited artists and invited academics.[1] Because of restrictions of access to such official sites, documentation of events in the lab becomes necessary in order to share such events. The performance in the lab is reanimated through publications with microscopy images, panels and conference lectures. Live events and live tissue culture projects created by artists in the lab are often subsequently re-mediated in the cultural sphere through exhibition documents. The crossover between performance and biological art practices expands the discussion of liveness and the viral as they transverse the cellular, molecular, digital, and cultural.

In the following pages I outline how performances in the lab and their re-presentation through documentation evokes a return to an

[1] In this article I focus specifically on the official scientific laboratory situated in the university context. It should be noted that performances in the lab may be intended for intimate audiences or none at all. Artists such as Kira O'Reilly and Adam Zaretsky and many others have created performances in such official labs. As well, many artists and amateur enthusiasts are generating DIY science experiments in garages, art galleries and various university programs challenging the exclusivity of more official lab sites.

Performance Research 14(4), pp.36-44 © Taylor & Francis Ltd 2009
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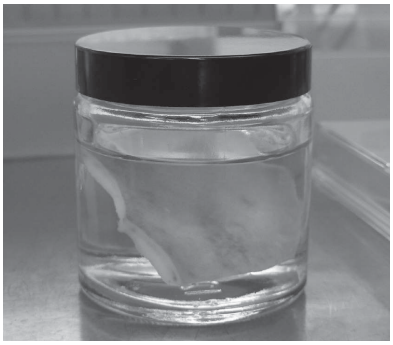
earlier debate fueled by performance art practices, where performance is understood as the origin of events and as such documentation is considered secondary and representative of past events. The biological arts or bioart, a field of artistic production newly entering the fold of art exhibition and conservation, is arguably reinvigorating similar assumptions. For example, bioart documentation may be perceived as authentic reproduction of live acts and/or live organisms, when such documents are clearly not an accurate representation of what occurred. Likewise, live biological organisms and events (often imperceptible to the unaided human eye) may be perceived as inert documentation. While many artists intentionally play with this confusion (often in the form of art hoaxes), cultural players and audiences coming to this work are often unaware of the implied irony of such artistic gestures. Arguably, the bioart document and bioart work are performing and mediating live encounters, they are not what one might assume. The assumption that documentation is based on authentic and factual representation of a 'live' event or life has long been contested in art theory. However, bioart introduces new challenges to how and what constitutes entities as 'alive'. It appears that such a discussion is necessary once again.

What I propose here is that the relation between performance and documentation is not a hierarchical, linear, or historical re-presentation of events as they occurred. Rather the event and its documentation can be perceived as a mutual relation evoking liveliness, or eventfulness. Art documentation invokes memory as much as it generates (or one could say performs) novel events.

I am not advocating a privileged space for documentation of performance and live (living) works created in the biological arts. Nor am I suggesting that performance events or living organisms should be privileged over documentation. Rather, both performance and documentation should be considered as generating different *thresholds* of liveness. It is with this mutual, yet differentiated, threshold of liveliness of event and document in mind that I wish to introduce the viral.

The threshold of liveness is both extended and recontextualised by new biotechnologies such as tissue culture engineering, calling into question assumptions of what is live and living. The Five Kingdoms of Life, the scientific classifications for organisms with a metabolism as life-forms, has been challenged by the Three Domains of Life where bacteria is understood to transverse all the categories of living organisms. In this diagram, the finite life of organic metabolism is also understood as being inter-connected with microbial life forms existing in a longer duration of time. Molecular entities are now perceived to be as important in maintaining the liveness of metabolic organisms as they are to their death. The virus, as entity and event, transverses the threshold of living and undead. The virus is exemplary in that it proposes a complex threshold of liveness and exceeds it.

Recent theorising on the viral in the arts and humanities has focused on the materialisation of digital media, wherein the viral is understood to manoeuvre through the transmission of electronic and digital information. Yet such references are often founded on metaphors and outdated concepts borrowed from biology and virology (Catts and Zurr 2008: 125). My exploration of the viral looks to current tissue culture engineering practices and



• **Jar – *Living Viral Tattoos* 2008** *Photo: Tagny Duff*

transplantation of synthetic retroviruses. My intention is to reinvigorate the notion of the viral through considering its virtual as well as cellular and molecular properties to examine how this conceptual shift implicates the relation between live performance and documentation.

Specifically, I will discuss performances and documents that I generated in the labs at SymbioticA, The Centre for Excellence in Biological Arts and the School of Anatomy and Human Biology at the University of Western Australia. While in residency there, I initiated a project that proposed the movement of viruses in mammalian host cells as both sustaining and exceeding the human, cellular and molecular performances in the lab and the art documents that circulate in the public context.[2]

Before providing a detailed account of my experiences in the lab, I will first draw our attention to the debate on liveness and the ontology of performance and document.

RETURNING TO AN OLD DEBATE WITH NEW QUESTIONS

In the mid to late twentieth-century many performance artists and critics called for a rejection of documentation as a strategy to resist the art market and commodification of the art object. Site specific performance, including happenings, situationist interventions, land art, and cabaret performances occurred outside of the gallery in the attempt to circumvent these conventions of the art world. Peggy Phelan (2001: 149) notes, 'The pressures brought to bear on performance to succumb to the laws of the reproductive economy are enormous.'

In situ performance works generated in official science laboratories face similar concerns. The pressure to produce documentation is doubled through the current culture of science and artistic practices that require evidence of research and development in return for financial sponsorship. As well, audiences cannot easily access the live work due to temporal, geographic or regulatory restriction of such a site. Therefore, performances in the lab are encountered through images and texts, albeit never as a representation of events they may claim to portray.

There is often an assumption that in performance or live works one must *be there* in order to experience the presence of the event. Certainly being there to encounter the eventfulness of transplanting viral host cells onto the skin of human tissue introduces a range of sensual and affective experiences. Smells, temperature, and sounds of specific environments introduce a particular type of visceral experience. The cultural specificity of the lab also generates a distinct encounter, one demanding extensive economic resources and cultural capital. It is important to note that a focus on the ontology of performance as that which is present may easily privilege a physical relation to a live moment or living organism as a more 'authentic' encounter than that with its analogue or digital reproduction. This notion follows Phelan's line of argument and it is one echoed by bioart curator and theorist Jens Hauser (2006: 132) who observes that 'on the one hand bioart defies reproducibility, on the other it postulates the importance of direct presence – and is usually read and interpreted via over-semantisation as secondary text or paratext'. Unlike the aforementioned arguments, my concept of the transversal relation between performance and documentation does not intend to foreground the 'presence' of performance or bioart within a founding moment or form of liveliness.

If we posit that both performance and bioart must be encountered through live presence, yet nonetheless enter into circulation by means of reproduction, is there not a mutual relation that is implicit here? Instead of situating the live event as a distinct and prior experience to its documentation, might it not be useful to conceive of how the document contributes to the threshold of liveness? Documentation might be seen, not as representation or interpretation, but as *in itself* productive of liveness.

Philip Auslander (2006) suggests that the art document in itself is performative and as such, is generative of liveness. He situates the concept of

[2] *Living Viral Tattoos* (2008) was done in collaboration with Dr Ionat Zurr, Dr Stuart Hodgetts, Maria Grade Godinho, Dr Jill Muhling and Oron Catts, with support from Guy Ben-Ary and Dr Steve Parkinson. The project is supported by SymbioticA. The Centre for Excellence in Biological Art in the School of Anatomy and Human Biology at the University of Western Australia, Concordia University, The Social Science and Humanities Research Council of Canada (SSHRC), The Fonds de recherche sur la société et la culture (FQRSC) and Le Centre interuniversitaire des arts médiatiques (CIAM).

liveness in performance as the result of a retroactive categorisation made possible by recording and broadcast technologies (such as audio records and television). Auslander (1999) further submits that before broadcasting technologies there was no live performance, there was *performance*. This is a convincing argument. However, I also believe such argumentation depends on how one perceives of technology. Oral tradition through storytelling, for example, may also be understood as a kind of recording reminding us of the fact that bodies are a form of documentation.

The Couple in the Cage (1992) is exemplary in this discussion as it reflects confusions pertaining to live performance and human bodies as documentation. In the performance, Guillermo Gómez-Peña and Coco Fusco exhibited themselves at art galleries caged as discovered 'undiscovered AmerIndians' from an unknown island accompanied by an elaborate and false ethnographic history. The artists became living human documents satirising, with great irony, a long tradition of museums, galleries and scientific ethnographic displays of living species. However, most of the audience perceived the artists as 'real' natives. Audiences could not distinguish between the performance (the ironic re-enactment of such display practices) and the documentation (in this case the inscription devices used, including the costumed bodies of the artists, the cage and the site of museum). This ultimately created another layer of dynamic complexity to the performance.

The manipulation of life forms through biotechnology amplifies this discussion further. Discourses on art and life stemming from performance art discourses shifts from the human body to that of other organisms and life forms at the microcellular, molecular and nano levels. This is becoming more prevalent as the capacity to engineer and manipulate living organisms through biotechnology and advanced computing is changing the status of liveness in art and life.

The use and production of biotechnologies raise new questions regarding the status and taxonomy of liveness of art documentation. Contemporary art works can be seen to aspire 'to become life itself, not merely to depict life or to offer its art products' (Groys 2008: 55). More specifically, Boris Groys proposes that art documentation is life, arguably performing live and as living. The question he raises is not what is live but how it is so. In particular, Groys suggests that life forms and liveness are generated through inscription and narrative.

While this direction of thought has tremendous potential to generate a fruitful rethinking of the biopolitical implications of performance and art documents, I hesitate to focus on narrative and inscription as necessary for generating the threshold of liveness.
I propose to take a slight detour from the trajectory of liveness of performance and documentation outlined so far, turning attention instead to that which exceeds inscription and narrative in a zone of indiscernability; that which slips through the perception of liveness and what escapes its capture: the viral.

THE VIRAL: MOVEMENT, VIRTUALITY, ENPRESENTING

In Latin the word *virus* literally translates to mean 'slimy liquid'. The idea of the viral is implicit in this definition, denoting the virus as both noun (entity) and verb (movement). Also implicit in this term are viscerality and movement of the unseen; the uncontained; what is alive and undead. The undead in this sense, suggests a threshold of liveness where the distinction between living and dead is not clear. The scientific classification of 'virus' refers to it as living when fused with cellular metabolisms. Yet, viruses exist whether perceived or not; as 'undead' (neither alive nor dead) until they merge with a cellular metabolism. As such, the threshold of 'living' viruses is subjected to scientific inscriptions of liveness when they transduce living cells. They are also known to exceed such inscription when moving through the realm of potentiality.

• Tissue – ***Living Viral Tattoos*** **2008**
Photo: Tagny Duff

The viral, then, is an event that moves through the virtual. Massumi (2002: 58) suggests, 'The time of the event does not belong per se to the body in movement-vision or even to the body without image. They incur it. It occurs to them. As time-form it [the event] belongs to the virtual, defined as that which is maximally abstract yet real, whose reality is that of potential-pure relationality, the interval of change.' The viral moves through the threshold of potential: the not yet named. The viral suggests a liveness that is becoming and will have become. In this sense, the viral is both actual, in that it is inscribed into the world of humans as a finite thing, and also virtual, in the sense that it exceeds such inscription.

The inscription of the virtual and actual movement of the viral occurs though enpresenting. van Loon suggests that enpresenting is a method of inscribing the viral that is not merely recording and documenting movements originally occurring in the past. Rather, enpresenting is 'a bringing into being, it is neither "presenting" nor "representing" as both notions imply a difference between essence (real) and appearance "image"' (van Loon 2002: 112). The act of encountering the viral, whether through the lens of laboratory science, medical science, or art is to actualise the threshold of liveliness between the virtual and its actualisation through inscription.

The viral is the mutual interrelation between performance and documentation. Such a relation is transversal; each evokes the liveness of the other. Documentation becomes performance, as performance becomes documentation and so on. Performance and documentation do not function as presentation and representation, where one precludes the other. Through 'enpresentation', performance and documentation enfold one another to generate encounters of liveness. This encounter is through human inscription and in excess of the human narrative.

How does this relate to performance and the document? The notion of 'live' event and live bodies are often situated as original moments of performance that are recorded and inscribed in the form of documentation. However such inscriptions of performance aided through documentation devices in art (as in science) are generative of and exceed liveness.

The following overview of *Living Viral Tattoos* (2008) explores these ideas further through my encounter with biological viruses and cells within the laboratory context.

LIVING VIRAL TATTOOS:

Stuart has worked with me in the lab for weeks in preparation for this event. We created a protocol for the transplantation of the virus and now is the moment that I perform it in the lab. I am working with human tissue donated to the project. Maria takes the digital video camera and I give her a quick review on how to use it to document the performance about to take place. Maria is the only live human audience member, participant and witness to this particular event. The cells and viruses are very much alive and thriving in their dishes. All the necessary materials for the transplantation are prepared: the donated breast tissue held in a plastic container, the viral cells in a six well Petri dish, four plate well dishes, PBS [Phosphate Buffered Saline Solution], scissors, forceps. Despite being prepared with the tools, I am not sure this is going to work. Following a protocol does not guarantee that the process will work. Tissue culture has too many variables. I take the forceps and pull out the tissue from its plastic container slowly while Maria records.

Peggy Phelan, as noted earlier, expressed her concern over the pressure to produce performance documents for various economies of reproduction. As an artist engaged in performance research, I often experience similar pressure to participate in the economies of reproduction, in particular, to generate documentation; to contribute to the currency of new research and new knowledge. My intention in working in the lab as an artist and researcher is not to produce or prove a theory or hypothesis, let alone to create a canon of artifacts and documentation. Performance research is speculative and evolves through unexpected and unanticipated discovery, while questioning the pressures implicated in engaging with such work.

Going into the lab, I set out to explore ideas of the viral through learning and applying biological synthetic viral vectors as both material and object of artistic creation. In order to create and encounter a performance at the level of the cellular and molecular I first had to learn tissue culture engineering practices. Ionat Zurr taught me these practices, and I worked with Dr Stuart Hodgetts to develop the skills and practices needed to work with biological synthetic retrovirus called Lentivirus (technically a non-pathogenic strain of HIV1 packaged in mammalian cells). I purchased the Lentivirus from a biotech company in the United States. This synthetic retrovirus is regularly used in scientific labs to deliver genes and protein markers through cells. Therefore, making the arrangements to purchase and have the custom made viral host cells delivered via mail order through the School of Anatomy and Human Biology was a straightforward and routine event. However, my appropriation of biotechnological materials and donated skin tissues from the context of scientific research introduces new challenges in the field of art when conceiving of living tissue and viruses as ready-made cellular audiences, performers and art objects.

There were many performances and performative events that occurred in the laboratory over the ten months of my residency. However, it was the transplantation of viral host cells onto skin in vitro that was the primary performance event. Ironically, most audiences would find the transplantation rather un-eventful as a live performance. The actions for this event included transferring cells transduced with virus in a pipette and then placing viral host cells over the skin. Each action was recorded with a digital video camera.

Something is wrong with the video camera focus, Maria notes. So I stop what I am doing, replace the tissue in the container and we look through the viewfinder together to correct the focus. Then I continue to remove the tissue out from the container and place it in a petri dish to clean it with PBS. I can feel the softness of the skins surface through the prosthetic extension of plastic and stainless steel. The cells in the skin are still alive and viable, even though they have been removed from the donor's body over an hour ago. I imagine the skin feeling warm. I know that the longer I wait to transplant the viral cells onto the skin, the less likely they will transfect the cells, and so I reach for the pipette. When I pipette the viral host cells over the skin, it flushes red. I am slightly horrified. I imagine such an infection spreading in my own skin and through the video lens.

What makes performing in the lab engaging is not just the images it produces, but the way one inscribes the action itself, and particularly what slips through such inscription. Dr Honor Fell, one of the early scientists working with tissue culture warned about the dangers (and paradox) of ascribing and inscribing human attributes to cells through what she termed 'the tissue culture point of view' (Squier 2004: 67). This theory posited that the controlled environment of in vitro science is not necessarily compatible with the world of human interaction. This is so often overlooked in the case of viral host cells, as they, like other microcellular organisms, are anthropomorphised in disregard to their impersonal and inhuman attributes. This is evident when I, and other artists and scientists in the lab, refer to their cellular performance in vitro as 'happy' when cells individuate and become confluent or 'sad' when they are not. And on the other hand, viruses can be objectified to such an extent that they are contextually removed from the human world and their dynamic interrelation with human experience is forgotten. I experienced this when documenting the movement of viral host cells through staining processes.

Immunohistochemical staining is a common practice in the scientific laboratory and was a primary technique used in the work. The movement of viruses through cells and tissue is documented through the reactions of antibodies in cells that are stained with colour dyes observable to the naked eye. This mode of inscription structurally alters the cells and does cause cellular damage. In a very physical sense, it becomes apparent that the mode of visualisation or 'marking' of molecular and cellular entities for human observation changes their structure and movement.

I came to see the practices of staining tissues as a kind of micro tattooing. The pipette aliquots chemicals that stain various proteins and enzyme reactions. In a sense, the pipette shares certain qualities of a sterile needle, allowing the user to carefully insert and remove liquids. This function creates patterns of colour that are then inscribed with scientific meaning. However, symbolic and metaphoric associations are entangled in such scientific inscriptions. As such, the ritual of marking and documenting the surface of skin through the art of tattooing can be seen in scientific documentation process at the cellular level as at the scale of the human. Tattooing at the micro level also connotes transition and change, as it does with ownership and the instrumentalisation of bodies. When I refer to biotechnology processes as tattooing, I am acknowledging that cellular and molecular bodies have obtained a new kind of (im) materiality that is territorialised and deterritorialised by technoscientific and artistic practices.

Tissue, organs, and cell culture from animal-humans have long been the material – or more specifically, the wet ware – of documentation in scientific lab practices. For example, animals in zoos and wet specimens in cabinets of curiosities have traditionally, and continue to be, considered as documents. The hype around mapping the human genome and the growing trend towards abstracting bodies through computational sequencing such as DNA databases currently overshadows the wet, fleshy part of such documentation.

In acknowledgement of the moist quality of documentation, I conceived of the process of transplantation and the means to trace the movement of cells as a micro tattooing in the form of a bruise: a viral bruise. The act of transplantation was amplified and documented not by the creation of colourful or aesthetically pleasing stains. Rather, bluish-brownish stains were created reminiscent of a bruise.

The staining process used to render a bruise formation occurred through various chemical reactions. The stain's appearance signals the detection of reactivity of antibodies to their cognate antigens. In other words, where the virus transfected the skin, the bruise became perceptible to the naked eye. This trace of infection documented and enpresented the viral simultaneously, revealing an excess in its visual inscription.

The bruise visually inscribes the presence of the viral, and suggests its virtual potential. On one hand, the bruise is a phase of both the growth and death of cellular entities with a circulatory system. On the other, given that the skin in vitro is not attached to such a metabolic system and a contusion injury has not occurred, a bruise is not feasible. This bruising suggests the potential for what might have been in wet bodies used in vitro and vivo. It can be seen as a memory of bruising that has, or will have, occurred in wet bodies used for various laboratory experimentations in vivo. It might be an injection of trial vaccinations in the bodies of humans. Most likely, however, this would be performed upon laboratory mice, race, rabbits and other animals. The construction of the bruise evokes the dialectic of regeneration and violence implicit in documentation practices of capturing and preserving live bodies and events.

Since the event of transplantation and staining the fleshy viral tattoos have been placed in paraformaldehyde fixative in glass jars. As such they are considered dead and preserved. But are they? Given my earlier reflection on arguments posited by Auslander and Groys, I would consider them as art documentation that have the potential to become living documents. They are not representations of the performance in the lab. Nor are they presentations. As enpresentations, they remind viewers of the unstable and transient nature of performance and documents. In a material sense the skin tissues are changing forms because the fixative is bleaching them. The stained bruises are becoming difficult to see. The visible bruises are fading, but the virtual bruises remain.

GOING VIRAL

Performing and documenting cellular and viral entities in vitro within the science laboratory raises new problems. No longer is it enough to write about 'live performance' as separate and distinct from the complications of 'documentation'. The interrelation between performance and documentation is understood as generating threshold of liveness as it transverses the actual and the virtual. The tissue culture point of view, the 'perspective' from the petri dish, is further explored as both inscribing and exceeding the liveness of the cellular as well as the human world. In order to encounter live events and entities at the cellular and molecular new terminologies and strategies are needed to expand the interrelation and threshold of performance and documentation practices. Going viral is one such strategy.

The *Living Viral Tattoos* engage in the complexities of performing and documenting the transplantation of retroviruses onto human skin in vitro. Performances in the lab and documents (such as this text) call attention to how documentation forms including video, photography, articles, animal-human bodies, cells, and tissue are mutually interrelated. This relation is viral and as such it calls for a biopolitical engagement. Rather than turn away from the pressures asserted by economies of reproduction, it is useful to consider how they implicate the status of liveness. One encounters live performance and documentation of the molecular and cellular not only in the lab, but in multiple environments. This might be through a

handshake, a kiss, and the giving over of a fingerprint at the airport when going through immigration and customs. In a day and age when laboratory protocols and infrared thermal imaging cameras are used to prevent the spread of viral infections and to quarantine animal and human populations, this is a timely concern.

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GLOSSARY

Five Kingdoms: The classification of life on earth is often referred to as the Five Kingdoms originally proposed by Robert Whittaker in 1969. It includes the Monera, Protista, Fungi, Plantae, and Animalia. A Six Kingdom classification system is also sometimes used, which includes Bacteria in additional to the Five Kingdoms.

Retrovirus: Unlike viruses, retroviruses (including HIV) produce an enzyme called reverse transcriptase. The enzyme assists retroviruses in replicating and recombining genetic material in host cells, often becoming undetectable by the immune system defense mechanisms.

Three Domains of Life: This model was proposed by Carl Woese in 1990. It suggests three phylogenetically distinct lineages of organisms on earth including Bacteria, Archaea (Prokaryotes) and Eukarya (Eukaryotes).

Transduction: In scientific terms transduction refers to the transfer of host genes from one cell to another by a virus. Philosopher Gilbert Simondon (1992: 313) expands this terminology proposing that transduction 'denotes an activity of individuation of a physical, biological, mental or social process emerging from the metastable relations between two disparate realities (the pre-individual state of being and the individuated state of becoming').

Transfection: The scientific term connotes the introduction and transformation of a prokaryotic cell by DNA or RNA from a virus. Transformation in this sense is specific to the transfer of genetic information where an infection may cause the conversion of cells to a malignant state (Madigan and Martinko 2006). Critical theorist Eugene Thacker (2008: 316) emphasizes the notion of transfection as being 'the ability of microbes to exchange, share, and distribute genetic information through a microbial network'.

APPENDIX 4

Video: *Living Viral Tattoos* (2013)
Director, videographer, editor – Tagny Duff
5 minutes

Screenings and exhibitions:

2013 – *Semi-permeable*, curated by Oron Catts for ISEA 2013 and the Powerhouse Museum, Sydney Australia.

2012 – Part of *The Coming Disturbance*, curated by Zach Blas & Micha Cárdenas for MIX experimental film festival, NY USA.

2011 – *Cellular Memorabilia*, solo exhibition at FoFA Gallery, Concordia University.

2008 – “Evolution Haute Couture: Art and Science in the Post-Biological Age", Noncommercial educational screening in the framework of the IX MediaForum, one of the official programs of the XXX Moscow International Film Festival (MIFF), curator Dmitry Bulatov (NCCA), co-curator Olga Shishko (Moscow MediaArtLab).

DVD/book publications:

2009 – *Evolution Haute Couture: Art and science in the post-biological age*. Ed. Dmitry Bulatov. The National Centre for Contemporary Arts. Russia. Pp. 122-123. Print and DVD.