Research in Brief

Cryobook Archives

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ABSTRACT *Cryobook Archives is a biological art project utilizing tissue culture and anthropodermic bibliopegy. The article outlines how the process of research-creation with synthetic biological viruses introduces a necessary rethinking of the materiality of contemporary digital media.*

KEYWORDS *Biomedia; Biological art; Cryopreservation; Research-creation; Anthropodermic bibliopegy*

RÉSUMÉ *Cryobook Archives est un projet d'art biologique fondé sur la culture de tissus et la reliure des livres en peau humaine. Cet article démontre comment le processus de recherche-création avec des virus biologiques synthétiques amène à repenser la matérialité des médias numériques contemporains.*

MOTS-CLÉS *Biomédias; Art biologique; Cryopréservation; Recherche-création; Reliure en peau humaine*

Cryobook Archives is a research-creation project and biological artwork utilizing contemporary practices of tissue culture engineering, book binding, and archiving to explore notions of virality. The process of inscription through scientific visualization instruments is explored and reconsidered in this project. Contemporary and historical forms of information gathering and archiving are further explored, particularly their roles in generating unstable bodies challenging contemporary inscription practices that define life forms and lifespan. The Cryobook Archives, in its process and public exhibition, provokes a reimagining of the viral. Current metaphorical uses of the term "viral" are reconsidered within the context of an interdisciplinary project that applies biotechnology to artistic practices.

Cryobook Archives features small handmade books created from human skin, pigskin, and paper (see Image 1). The fleshy "pages" of the books, sections of human skin donated from a patient undergoing elective cosmetic surgery, are imprinted with illustrations of HIV symbols[1], rendered through the transfection of a biological virus called Lentivirus, a non-pathogenic strain of HIV[1]. The virus used to render designs was bought and mail ordered from a biotech company that custom makes synthetic

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viruses. Cells were first grown in the lab and then transfected by the virus. Custom made leather book stamps featuring the relief of the HIV illustrations were imprinted into human and pigskin pages, then filled with viral host cells (HaCaT cells)[2]. The cells were fixed and then stained in order to render the designs on the skin visible to the naked eye. The books are currently exhibited in a portable freezer unit built in collaboration with engineer and NXI Gestatio Lab researcher, David St.Onge[3]. The unit is modelled after small wooden library boxes used to deliver books to lighthouse outpost workers around the Great Lakes region in Canada and the USA during the nineteenth century. The process of making the cryobooks, the materials used in the project, and the display of the exhibition, all explore notions of the viral.

Image 1: Cryobooks (Before cryopreservation) 2010.

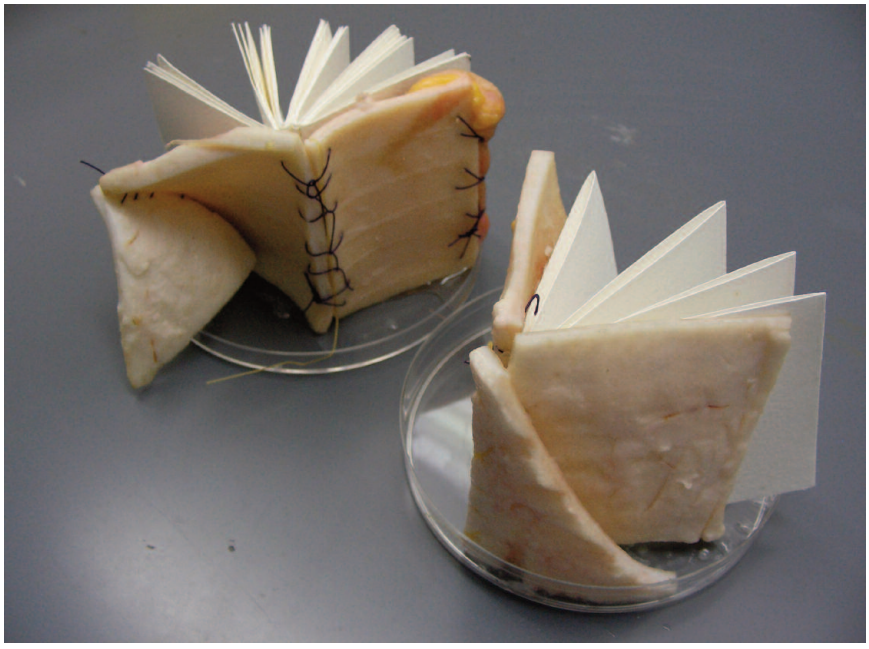

Photo credit: Tagny Duff

Viral, virality, and circumnavigating inscription

Virality or the viral is, arguably, a key conceptual preoccupation in the 21st century popular imaginary. The term itself is used to describe the distribution of data and knowledge via the Internet, as well as the global spread of viral pandemics across geographical and biological systems. "The viral" is often expressed as both fear and desire around contamination of the integrity, longevity, and memory of such systems. Metaphors of the viral may be drawn from analogies to illness, disease, and military force, and can be applied to both biological and digital viruses. The viral is pre-emptively "defended" with computer anti-virus software that protects against attack by

malicious invaders. The fear of an impending viral epidemic may provoke quarantine and suspension of citizen rights in order to prevent infection and spread of contagion.

The term viral, in this project, is not a metaphor borrowing from the epidemiology of human viral infection or virology, the study of biological viruses in the laboratory. The Cryobooks Archives provokes a reconsideration of the use of the term both by making and exhibiting books made of synthetic biological viruses, customized via a digital DNA sequencing database and various digital and analog distribution networks. The viral, in this case, emphasizes explicit relations between, across, and through human vectors and non-human distribution systems (economy, internet, global epidemic et cetera) generative of "surplus value of code … capturing and exceeding binary logic" (Deleuze & Guattari, 1987, p. 11). In other words, the viral is explored as both a digital movement across networks and technological assemblages, as well as cellular bodies and organic matter.

The notion of virality and viral is most notably explored by earlier philosophers Deleuze and Guattari (1987). Their concept of the rhizome foreshadows contemporary writing on the viral. Borrowing from the finding of early virologists who discovered that retroviruses jump the species barrier, they proposed in *A Thousand Plateaus*, a paradigm shift in how humans perceive of and inscribe the interrelationship between humans and non-humans. They call for the embrace of trans-species relations, and pre-empt the current political call for a post-anthropocentric world where human subjectivity no longer is the privileged perspective.[4] The philosophical stance has since been expanded upon by contemporary theorists, including Manuel de Landa (1997), who, in *A Thousand Years of Non-linear History*, emphasises the ecological and geographic migrations patterns of humans and non-humans as vectors for viral movement across vast landscapes of time and space. Media theorist Jussi Parikka (2007) articulates the need to "elaborate a viral politics and a viral ontology in order to perceive how power operates in the imperceptible networks of the digital code and molecular biology" (p. 267).

By working directly with tissue culture engineering practices in the lab to make the Cryobook Archives, the project is inspired by the work of this literature and aims to explore first hand how current use and application of retroviruses might bring another perspective to, and reconsideration of, virality as an alternative mode of inscription performed by visualization tools and contemporary popular cultural references today. The Cryobook Archives explores the reliance on inscription devices to materialize the viral, in this case, viral cells, by emphasizing the fragility and temporality of the fleshy and wet materiality of the viral host in the form of the book. The temporal and material quality of tissues across species is particularly important. Books, for example, are routinely made with the cells and skins of trees (paper) and animals (leather). In a concrete sense, tissue culture, genes, viruses and bacteria, sometimes in combination with digital media, form books of the 21st century. These books, or wet media, are generated and stored in scientific laboratories akin to literary libraries.

In the lab, one "reads" cellular and molecular movement as wetware, then documents it in order to signify and construct facts and meaning (Latour & Woolgar, 1986). The laboratory is set up to record, store, and catalogue specimens in archives and slide

libraries. Frozen specimens and slide specimens are labelled with the name of the author/scientist and date as one would a book cover. The wet frozen specimens themselves become the content that can be read via various visualization instruments. Visual and media literacy is necessary for this form of reading, whether through the colour coding of assays, microscopy slides and images, diagrams, or genetic coding, et cetera. Bruno Latour notes in *Science in Action* (1987), this reliance on reading science specimens through visualization instruments,

> [w]e can see more, since we have before our eyes not only the image but what the image is made of. On the other hand we see *less* because now each of these elements that makes up the final graph could be modified so as to produce a different visual outcome. (p. 66)

Furthermore, he observes the importance of visualization tools required to make meaning: "What is behind a scientific text? Inscriptions" (p. 69).

Cell culture is regularly cryopreserved in cryostasis for unforeseeable periods of time, so that it may be referenced at the discretion of the researcher in the future. As time passes, signification changes, and returning to cryopreserved specimens may prove or reconstitute a semantic and grammatical order of an experiment. In other words, cells can be revived from cryopreservation, grown, and proliferated to perform liveliness in a petri dish, changing the semantic and grammatical constructions required to document experiments. As with dry tissue-based books and documents, these frozen wet documents may also outlive their donors. The cryopreservation of specimens is done in the form of stasis: neither alive nor undead. Such a stasis does not suggest the end of a process, but rather the potentiality of events where zombie viruses reawaken in their cellular hosts. In many cases, as Latour and Woolgar (*Laboratory Life,* 1986) note, wet lab experiments are preserved for long periods of historical time in the form of publication materials circulating as journals and books. These dry tissues may also experience a stasis, stored in dark basements for a human lifetime, only to be revitalized by technologies of signification.

The Cryobook Archives explores the potential for the frozen books to be experienced and read, not merely as a preserved and finished work, but rather as viral. The cryobooks introduce and disrupt semiotic reading by provoking a visceral encounter. The formation of tissue into the shape of books signifies their relationship to language. We see the human skin bound into book form and, as such, can identify signifiers and signified meanings, depending on how we are situated historically. The books also provoke sensations that are not expressed through language or emotion. A slippage and a surplus code emerge from the semiotic chain of meanings, introducing a viral relation. This slippage exceeds the act of reading and tracing of the work. The entanglement between semiotic meaning and affective sensation creates new assemblages. Books become viral, viruses become books, and human-animals become book viruses.

During the process of making the cryobooks in the lab, viruses are "read" by various visualization methods, including the western blot method and fluorescent microscopy. Colour detection, structural shape, and form detected by techno-scientific instruments create patterns that may be read, inscribed, and indexed. The Cryobook Archives utilize these practices of reading, while deliberately attempting to subvert

the inscriptions and functionality of such practices. The rendering of the viral cells on the skin of the books suggests an unconvincing specimen from a scientific perspective. In fact, the protocol used to visualize the stains did not work properly, and rendered the areas of transfection white instead of blue. This mistake, or failure of the inscription, became a desirable, if unplanned, aesthetic element of the artwork.

Technologies of signification and temporality

Inscription by technologies of signification across artistic and scientific modes of reception is explored in the Cryobook Archives. Theorist van Loon (2002) makes a convincing argument regarding how inscriptions are indexed via instruments of science and then read via aestheticization and rationalization, two aspects of technologies of signification:

> Technologies of signification install into the "present form"‘ strings of symbolic associations which allow people not only to come to terms with new insights granted by technologies of visualization, but also to encounter them properly, both in syntagmatic and paradigmatic terms. Moreover, technologies of signification allow such symbolic associations to take place in a partial preconstituted semantic and grammatical order, which grants the necessary discursive continuity that reception requires, and enables a response to make sense. (p. 113)

The technologies of signification in scientific and artistic spheres are becoming increasingly important now that new image capturing capabilities are available through ubiquitous computing, supercomputers, and high-resolution digital screens. These faster and high-resolution image-based instruments, with great memory storage capability, are changing the way both fields are practicing and producing knowledge and meaning.

Materializing semiotic meaning through wet media—such as body parts—is less common in the realm of biological science, as instructors of anatomy courses now routinely teach surgery techniques via the digital screen and remote broadcast, rather than the traditional "hands-on" dissection of cadavers. The practice of working directly with bodies and organs, and the hand/eye coordination that this entails, is becoming obsolete in various areas of research. The Cryobook Archives reminds the viewers of this by provoking a re-reading of a forgotten and now controversial practice called anthropodermic bibliopegy. This craft, done by medical surgeons, involved the binding of anatomy books with human skin and emerged at the same time as the field of biomedical surgery in Europe in the 19th century (Alban, 2009; Thompson, 1946). At the time, the practice of preserving and binding human skin was an important practice for studying human anatomy in a visceral form not possible with drawings or photography. Surgeons undertook the practice as an homage to the life of the patient and as a mode of research to better understand the human body[5].

The Cryobook Archives blend older and contemporary forms of preservation, such as bookbinding and cryopreservation strategies, highlighting some of the material and temporal limitations and potential of biotechnologies. In contemporary popular culture, hope and promise of a new progressive medical discovery propels biotechnolog-

ical research; yet, the longer term health effects and affects on bodies of all kinds—human and non-human—are not known. Extending and preserving bodies, specimens, and memories does not create an endpoint; rather, such processes and technologies open up a range of imperceptible and unpredictable vitalities. For example, cryopreservation of cell lines and tissues (in 77 Celsius or over) suspend biological specimens in stasis for an indeterminable future that may exceed the donor's life span. Specimens are induced into stasis and are revitalized through careful biosensory and environmental manipulation. In theory, the cryobooks (and tissue and virus) could be preserved "forever"; however, environmental influences could easily (and most likely) interrupt this desire for immortality. For example, the electricity could go out and the freezer would lose power, leaving the cryobooks to thaw and then decompose. The idea of "forever" or "immortalization" is contingent on both the technological and environmental situations.

The various processes used to create, preserve, and display the Cryobook Archives explicitly reveal that documentation and preservation changes the temporal lifespan and structure of the tissues. Cryopreservation may damage the structure of the tissue if it is not prepared with chemicals. The microscopy documentation also requires chemical alteration of the specimen to be visualized. Most interestingly, the ability to extend lifespans via immortalized cell lines and cryopreservation has on the one hand expanded the life of various tissues, but has also contributed to the increase in contamination of cell lines (Dunham & Guthmiller, 2009). Human error and contamination in the laboratory has generated new interspecies and intercellular co-minglings, creating hybrids and chimeras. These "accidents" generate new temporal and spatial arrangements of time and life. New "virtual" entities are now being considered life forms but do not, as of yet, have taxonomic markers assigning them to the tree of life. The time of these chimerical "births" are not known, and in many cases are not yet identified. The durational life of these chimeras may exceed measurements that are based on filiations of different species.

The public exhibition of the cryobooks in a portable custom-made cryopreservation unit (see Image 2) amplifies the generative qualities of archival presentation via the cross contamination of tissues from a historical perspective. The freezer apparatus is modelled after wooden portable libraries used to deliver books to lighthouse workers around the Great Lakes in North America in the Nineteenth Century. The shipping routes from the Atlantic Ocean brought news from Europe, along with bodies incubating viral influenza, small pox, and a range of other viral diseases. Outposts were not only the sites for mobile information and trade, they were, as de Landa (1997) notes, often sites of quarantine meant to prevent the circulation and intermingling of viral tissues and bodies. The history and spatial migrations and contamination of the viral is exemplified and performed by the cryobooks in the lab and beyond. In the case of the Cryobook Archives, the art gallery becomes one of the "lighthouse outposts" that must negotiate and guide the movement of viral books and transmission across science laboratories, public encounter, courier services, customs brokers, and quarantine officials. The Cryobook Archives participate in the temporal spatial circulation and trans-species relation within and outside of the exhibition frame of the gallery or

the scientific laboratory. One example of this is the decomposition of one of the cryobook pages after transporting the cryobooks from a recent exhibition, back to the science lab where they are stored in cryofreezers. Despite all efforts to maintain an even temperature and sterile conditions, contamination and the introduction of microbial life occurred. Non-human agents have a large role to play in the temporality and longevity of carbon life, but are often dismissed until visualized. In this sense, the work is not a fixed representation or preservation of materials and concepts explored in the research and art production phase, but, more importantly, an active agent participating in, while circumnavigating, the processes of signification across various multiple spatial and temporal fields.

Image 2: Cryobook Archives installation displayed at Visceral, Science Gallery, Dublin Ireland 2011

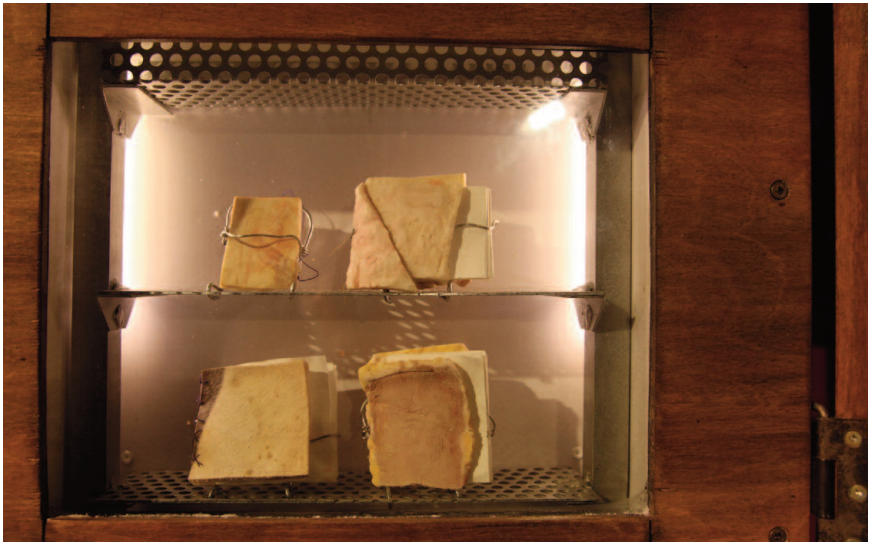

Photo credit: Patrick Bolger

The Cryobook Archives offers a moment to reflect on the relationship between old and new technologies that challenge human perception of virality. The re-reading of visualization and aestheticization of viruses and the viral is key at this juncture in human history. Becoming involved in the technologies of production and signification of the viral, as well as creating artistic works that intercept, question, and reconfigure the processes of meaning-making is a political gesture. Creating alternative visualizations of the viral can produce novel ways of thinking and experiencing the interrelationship of species and non-human forces that must and do co-exist on the planet. The wet leaky bits, often, are forgotten or omitted from discussions relating to virality in the digital humanities. Digital media theory, digital art, and popular media culture can stand to expand their reach to wet fleshy parts usually hidden from the equation of information creation across time and space. Digital media is never without moist hosts, nor are hosts without viral relations.

Notes

1. The images were designed by Canadian artists John Greyson, Vincent Chevalier, and Tagny Duff.

2. The non-pathogenic Lentivirus is a third generation vector cloned from HIV strain 1 that no longer can replicate. Lentivirus is constructed from the genomic sequence of a wild HIV 1 virus, but various genes have been removed and/or inserted to create a synthetic virus.

3. The first exhibition of the work was part of Visceral, co-curated by Ionat Zurr and Oron Catts, and exhibited at the Science Gallery in Dublin Ireland, in 2011. The feasibility plan for the Cryobook Archives display unit was also directed by David St. Onge, and developed by Jean-Michel Dussault and Benoit Allen. Additional prototype design by Stephane Collin and Alain Gagne Inc. The glass for the unit was generously donated by Multiver. Various aspects of the research and development of the cryounit was funded by the Social Sciences and Research Council of Canada. The prototype for the immunohistochemical staining of the cryobooks was developed by Dr. Stuart Hodgetts, of the University of Western Australia. Lab consultation with Greg Cozens, of the Anatomy and Human Biology Department at the University of Western Australia and SymbioticA. The research and production of the tissue sculptures was produced during a residency at SymbioticA, The Centre for Excellence in Biological Arts in 2009, and funded by The Canada Council For the Arts.

4. Much of Delueze and Guattari's work on the concept of the rhizome borrowed from early virology where key aspects of the concept borrow explicitly from scientific laboratory work of scientists working with retroviruses, then called C viruses, in the 1970s (including Charles J. Sherr, G.J. Todaro, R.E. Beneveniste). They note the following in *A Thousand Plateaus* (1987):

> Evolutionary schemas may be forced to abandon the old model of the tree and descent. Under certain conditions, a virus can connect to germ cells and transmit itself as the cellular gene of a complex species; moreover, it can take flight, move into cells of an entirely different species, but not without bringing with it "genetic information" from the first host (for example, Benveniste and Todaro's current research on a type C virus, with its double connection to baboon DNA and the DNA of certain kinds of domestic cats). (p. 10)

5. A number of cases have been documented where lovers have shared flesh in the form of books. Such a practice also reveals a darker past, notably in America and the practice of binding books with the flesh of prisoners hung for supposed illegal activities.

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