

David D'Ostilio

Growth (in)formed

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## Abstract

### A.

Growth (in)formed is a project utilizing sculpture as a process by which to explore the body, ecology, and technology. The works produced for this project are experiments merging living organisms and digital manufacturing methods into figurative forms that comment on humanity's status as part of a larger ecology. This body of work looks to a future in which methods and materials traditionally utilized in both art making and cultivation are joined with digital manufacturing, automation, and bio-technologies. This collaboration is a key to the evolution of humanity in harmony with planet Earth. Growth (in)formed works within the framework of Eco Art by using living organisms and systems to illuminate the interspecies connections that make life possible. Sculpture becomes a catalyst that pushes us to realize our place within the larger ecosystem. These sculptures are designed to change appearance by way of decay and production over the course of time. Their connection with organic materials gives them a lifespan that is with a different scope of time and rate of change than more traditional mediums.

### B.

The bulk of the sculptures in this project explore the human body as a form. Particularly they focus on my own body. The sculptures feature disembodied limbs as well as full figures. The disembodied limbs featured are legs and arms, these are symbols of action and agency, our limbs let us navigate and influence the world. Legs are our base, our foundation as well as our locomotion. They tie us to the past and

future, marking where we have been and where we are going. Arms are symbolic of our labor, of our ability to manipulate the world around us. Arms are a source of strength and action. The human figure is the tool by which navigate and manipulate the world. It takes up space and has form. The body has many vital actions that function outside of our conscious control. Our bodies set our physical parameters in the world, as well as give us the senses necessary for experiencing the physical, while at the same time running multiple systems independently of our conscious thought.

Seeds, spores, and bacteria are actors upon the human in this body of work. These living organisms are paired with wood, clay, iron, and foam. These inorganic materials help to create structure for the organic materials. The rigid forms become vessels to facilitate growth. These figures are subverted by the growth of other species. This growth within and upon bodily forms brings the human form closer to the earth. The connection is fortified through roots, mycelium, bacteria pushing into wood and soil. By inoculating carved wooden legs with shitake spores I am pointing to the potential within ourselves to produce future growth. The decomposition propels our growth into a more compassionate and connected species. One resource is transformed into another as organic material breaks down and becomes nutrients for another organism.

With growth, reproduction, and fertility at the forefront of my project, another area of the body focused on will be the sexual organs. The penis is a feature of the ceramic sculptures, these phallic symbols are turned into vessels for growing vegetables. These vessels contain and hold a living, growing organism. The masculine and feminine blend to become one nurturing form. The full scale male figure features a penis, which

combined with the growth of vegetation on the figure itself points toward the male fertility of spreading seed. The male spreads hundreds of thousands of sperm compared to the female releasing one egg at a time. This is embodied by thousands of seeds sprouting on the male body, creating a green fur on the figure. A symbol of the power within the figure to shape the world through future generations. Reproduction is a form of time travel, effecting the world both now and in the future with not just the spreading of DNA, but also of ideas that can be shared through generations.

It will not just be my form used in sculpture, but also the form of my wife, Stephanie. In a reference to other symbols of the feminine and fertility Stephanie poses like Sandro Botticelli's *The Birth of Venus*. But Stephanie is pregnant, celebrating the beauty of motherhood. Botticelli's *Venus* features the goddess riding a scallop shell on her arrival. It has multiple meanings, but one proposed is the fusion of spirit and matter.<sup>1</sup> One could say this is analogous to having a child, bringing a new being, or a new spirit into the physical world. A conscious choice is made to start a family, but the fertilization of the egg and growth of the embryo is uncontrolled. We let nature take its course in the growth and development of the baby in the womb. This sculpture will be carved in wood at 1/2 scale.

The works I present will be a full scale figure of myself, based on a 3D scan, carved in foam on a seven axis robot and finished with soil and seeds which will grow and transform the work through natural processes. Another piece features two legs carved from oak logs with a seven axis robot. These legs are based on 3D scans of

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<sup>1</sup> The Uffizi Gallery, Sandro Botticelli, *The Birth of Venus*, 1485 <http://www.uffizi.org/artworks/the-birth-of-venus-by-sandro-botticelli/>

myself as well. The oak logs have been inoculated with shitake mushrooms. The form of the legs will change as the mushrooms grow. In addition to these works are castings taken of the arms carved on the seven axis robot. Mycelium is grown into the casts to create fungus arms. The next group of works uses the potterbot to 3D print ceramic sculptures. Based on 3D scans of my lower body, these sculptures are vessels which are being utilized to grow vegetables. Another work is an approximately 1/3 scale wood sculpture carved in maple on a seven axis robot. This sculpture is based on a 3D scan of my pregnant wife in the pose of The Birth of Venus by Botticelli. The maple sculpture is inoculated with oyster mushrooms. Another work is a sculpture carved in foam with a seven axis robot that is a mushroom comprised of human arms and legs. This work is finished with cement, soil, woodchips, and beeswax. In addition to these works the presentation will feature documentation of the process involved in making these works.

## Introduction

The project Growth (in)formed is much changed from its earlier iterations. The path to this thesis has seen changes in concept, technology, and within my life. While developing my thesis I had the opportunity to go to Italy and design a marble sculpture, have it milled by a 7 axis robot, and then hand finish the carving. Upon returning from this trip, William Paterson University obtained its own 7 axis robot. The access to this technology has been an impetus for change in my practice. The industrial nature of the process has made me think about the commodity status of the objects sculptors create. These sculptures are luxury items, they represent ideas, but their lack of function makes them accessible to only those with disposable income. As a result I began searching for a way to make the art I produce more meaningful or productive.

My earlier work was focused on labor, but engaging with technology changed my relationship with labor, tools, and my place in the conversation. I embraced this change, but I still had issues with creating an endless amount of objects to be ogled. What value is this technology and these tools if they produce trifles? Or even worse, what if this production only truly creates waste? *“Let us now consider the residue of each of these products; it consists of the same unsubstantial reality in each, a mere congelation of homogeneous human labour, of labour power expended without regard to the mode of its expenditure. All that these things now tell us is, that human labour power has been expended in their production, that human labour is embodied in them. When looked at as crystals of this social substance, common to them all, they are – Values.”*<sup>2</sup> |

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<sup>2</sup> Karl Marx, Capital: A critique of Political Economy, (Moscow, Progress Publishers, 1867) 28

questioned deeply the value of unlimited production in the face of limited resources. If Value is tied to human labor, then what value do CNC produced objects hold? What purpose do an endless stream of luxury items serve when the production of these objects depletes the earth of its resources? How do these objects hold value when their production is shifted from skilled hand workers to automated factories? What role does this concept of value, labor and technology in the environment?

These questions led me to look at technologies that helped the earth, that were renewable, sustainable, and biocentric. I was looking at social practices that could change the way we lived and our relationship to the earth. I looked at production of food and energy. Looking for a more local renewable way to supply food and energy. What other technologies could be incorporated into this model of living to make life more efficient and sustainable?

I researched farm robots, robotic bees, biotechnology, and aquaponic systems. One of the artists I researched was Ken Rinaldo, who makes work with ecological systems. (fig. 1) I began plans and construction for a household aquaponic system. (fig 2, 3) I built sculptural objects to grow food, herbs, and other vegetation. I worked on designing a system to be functional and aesthetic. It was really an engineering project with aesthetic design. This was the first iteration of my thesis, indoor aquaponic systems, the aesthetics of highly designed DIY engineering. In questioning art, I had moved away from art, in questioning production, I had set myself up for failure.

I was missing something mysterious, poetic, artistic in this approach. As I explored other technologies like 3D scanning my body became an option for sculptural

experimentation. I could combine an interest in ecological issues with digital production into a form that spoke to my experience and my place in the world. My body added this place, this context in the world. The figure brought humanity to the work while allowing for experimentation with technique and materials. These experiments revolved around materials I was unfamiliar with. I was incorporating the element of chance and the possibility of failure into each process. It is this possibility to fail and learn that is essential to using these materials in my thesis.

Growth (in)formed is a series of experiments combining the use of 3D scanning, digital production, and biological components to explore the human form as well as relationships between materials and species. Relationships between species is a fundamental aspect of human advancement and central to this project. In addition to exploring ecological relationships, Growth (in)formed accepts the failures and limitations of ones own body and mind.

## Influences

I have a wide range of influences in my life as well as pertaining to this project specifically. These influences include family members, work experience, nature, technology, science, artists, designers, and architects. These interests have been accumulated by means of chance, determination, and lineage. Art and science are in my family. I was exposed to them and encouraged from a young age. Technology and design are interests that I sought out to investigate. There were elements of chance involved in each interest and how they were fostered. Chance has played a huge role in my life, I see it as being a necessary part of my practice as well. This allows for elements outside myself such as natural processes, unknown outcomes, and viewer participation to affect the image or form of the work.

My grandfather, Dominick D'Ostilio, inspired my interest in art, as he was a painter, as well as a scientist. (fig 4.) His interest in both subjects has been a lasting inspiration for me. One of my earliest memories is being in his studio while he painted an arrangement of taxidermy birds. I made the decision to study art seriously because of him. One of my first serious bodies of work was a series of abstract paintings based on his illustrations in the book "The Lives of Wild Birds" by Aretus A. Saunders.

My influences have changed along with my art education. I have shifted from studying and practicing painting and illustration to a sculptural and performative practice. My influences have shifted from expressionistic, surreal, and psychological towards more conceptual, quotidian, and phenomenological. This has affected the artists I look at, am inspired by, and research. It has also affected other subjects I read

and research. In the past I read more novels, science fiction and fantasy. I now read more biographies, collections, and non-fiction with a focus on artists, scientists, and nature.

Artists that have influenced me recently include Joseph Beuys, Pierre Huyghe, Robert Smithson, Ken Rinaldo, Gavin Munro, Olafur Eliasson, and Mathilda Roussel. A common theme connecting these artists is an interest in the natural world, and an attempt to connect with forces and places outside the gallery. This selection of artists uses natural processes and the ephemerality of time and place as a part of their work.

Joseph Beuys incorporated living and dead animals into his art practice, in his most famous work he lived in an empty room with a coyote for three days. (fig. 5) This work is about connection or loss of connection with our past selves. It addresses issues of nature, urbanity, identity and control. It inspires my work directly with its incorporation of other living species as well as the ceding control of an artwork to an entity with its own agency outside of the artist.

Pierre Huyghe also incorporates living creatures in his artwork. He created classical figurative sculptures, but installed bee hives for their heads. (fig. 6) As the colony lived, the size and shape of the sculptures would change. The sculpture creates an environment for the bees to live in, but the form of their hive is out of the artist's control. The bee's health and ability to thrive will determine the shape of the sculpture. His ceding control to forces of nature is inspiring to me.

Robert Smithson's focus on the land in addition to humanity's ability to alter the function, appearance, and sustainability of specific places resonates with me. This includes effects on resources, flora, and fauna. Smithson's Floating Island is of particular interest. (fig. 7) The artist conceived of building a floating garden on a barge and sailing it around Manhattan. The dream was achieved after the artist's death.

Ken Rinaldo is an artist working with ecological and technological materials and themes. Rinaldo incorporates new media, robotics, and digital methods with living creatures including vegetation and fish. Rinaldo's piece Farm Fountain in collaboration with Amy Youngs was a big influence on my beginning to investigate ecological matters and incorporate organic materials into my work. His robotic and programming work also pushed me to delve deeper into new media and digital production. My interest in programming both milling and working to automate an aquaponic system are examples of this influence.

Gavin Munro is a furniture designer who wanted to focus on growing his designs. He saw it as a way to cut out waste of traditional furniture building. Munro created an orchard to grow trees around armatures in the shape of his designs. (fig. 8) His designs then need minimal shaping to become a piece of furniture. This dedication to growth, and thinking about resources and sustainability are inspiring to me.

Olafur Eliasson is an artist who works in many mediums. He creates phenomenological works that focus on a natural resource, or process. He built waterfalls in the East River in New York City. (fig. 9) Eliasson is an artist thinking about the Earth and its resources. This work brings attention to our use of resources and our

dependence upon the natural world. His works seek a level of control over nature that isn't sustainable. Eliasson's goal is to help people work towards sustainability by focusing on the preciousness of our resources. It is this focus that highlights their beauty and fragility, hopefully inspiring action by the viewer.

Mathilda Roussel creates figures and installations using living grass and soil. (fig. 10) This transference of grass from part of the environment to a representation of the human form holds a direct connection to my work. The Lives of Grass features suspended bodies growing grass as they appear to be falling through space brings the body and the environment into closer orbit with one another.

In addition to these contemporary artists, I have also been influenced by more traditional sculptors. Michelangelo di Lodovico Buonarroti Simoni, Donato di Niccolò di Betto Bardi, and Auguste Rodin have made an impact in my research leading up to this thesis. Seeing Michelangelo's work in Florence last summer was awe-inspiring. His work has a mastery of the human form and emotion that is unrivaled. The David is so monumental and skillful. (fig. 11) It was seeing these Renaissance works up close that inspired my first forays into figurative sculpture.

Donatello is another renaissance sculptor who's skill has inspired me. His bronze David is one of the finest objects I have ever seen. (fig. 12) The delicacy and strength of the figure is highly sexualized. It is a true masterpiece, as well as a technological achievement, as it is one of the first bronze castings made since antiquity. It is another compelling work that pushed me to thinking about figurative sculpture.

Rodin's modernism is very different from both Michelangelo and Donatello's work, but his mastery is unquestioned. The raw expression that his work evokes is powerful. I have been specifically looking at his sculptures of Balzac. (fig. 13) The nude Balzac influenced the pose I chose for the self portrait. It is a powerful yet awkward stance. Balzac does not have a classical physique, yet his confidence is obvious in the sculpture.

Rosalind Krauss' "Sculpture and the Expanded Field" has been a big influence in my thinking about sculpture. It is a writing that can be reapplied and updated continuously. (fig. 14) This writing is key to understanding sculpture outside of traditional materials. The expanded field seeks to identify places where art happens outside of the traditional. It is this line of thinking that encourages the development of conceptual art, eco art, and new media art.

Linda Weintraub is another writer who has inspired me with a focus on Eco Art. In "To Life!" she lays out what it means to be an eco artist, and why it is important. Weintraub puts together many disparate thoughts and practices into a cohesive collection of eco artists. She catalogues contributions from artists who have the earth or environment as a focus of their practice.

In the field of science I have become interested in Paul Stamets, a naturalist and biologist whose specialty is mushrooms. (fig. 15) He studies mushrooms' effects in nature, how they interact with the forest, the function they play in the ecosystem, specifically how they create a network to transfer energy throughout the forests floor while fixing nitrogen in the soil that allows plants to get the nutrients they need. He also

studies how mushrooms are used for food, medicine, and as a raw material for industry. Stamets is inspiring because of his passion for mushrooms, and the earth. His knowledge on the subject is vast, and while he is creative in his research into fungus he also has an entrepreneurial mind.

## Context

This thesis fits in the umbrella of Eco Art. The project incorporates natural systems and living organisms into its creation. Its primary goal is draw connections between our bodies and the earth. *“We must know both the plant and animal life in practically all of their forms: the water, soil, air, weather, and geology. In fact, it is probably true that no one person is completely equipped to make a thorough and complete study of ecology, even in a single habitat.”*<sup>3</sup> The works explore the circle of life that all organisms participate in. Accepting ones place in a larger system is very freeing and allows me a large amount of peace and focus.

Eco art is a wide field that can cross medium, process, and intent, but there is always a connection between humanity and the earth common to eco artists. This is the piece that was missing from my earlier explorations. The work needed a wider issue for a more accessible message, while being personal enough to insert my own humanity into. *“Moacir Gadotti (the president of the deliberative council of the Instituto Paulo Freire, in Brazil) states: “To us, sustainability is the dream of living well; sustainability is a dynamic balance with others and the environment, it is the harmony among differences” (Gadotti 2009, pp. 13-14). As a shared dream, vision and worldview (as pointed out by Gadotti), as well as a conversation (as described by Robinson), sustainability reveals itself as a cultural phenomenon, if ‘culture’ is understood as value system and set of signifiers framing social identities and dispositions to act and to believe. Culture is a collective memory of a plurality of knowledge, know-hows and*

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<sup>3</sup> Aretus A. Saunders, *The Lives of Wild Birds*, (Garden City, New York, Doubleday & Company, Inc. 1954) 180

*rules/conventions.”*<sup>4</sup> The environment and health of our planet is an issue that should matter to everyone. It is an issue that affects everyone presently and will affect future generations as well. In my early research I was looking at the health of bees, and their correlation to a healthy planet with widely available food stocks. This interconnected dependence of species carried through as the project changed. With a growing population we must be able to feed everyone. *“In the natural community, whenever a population’s food supply increases, that population increases. As that population increases, its food supply decreases, and as its food supply decreases, that population decreases. This interaction between food populations and feeder populations is what keeps everything in balance.”*<sup>5</sup> We need to investigate how to do this in creative, sustainable, and artistic ways.

With a focus on the health of the earth, food production, co-dependence of species, and looking forward to future generations. This project looks to be a bridge to a new generation. During the course of developing this project my wife became pregnant. Fertility and the future became an even greater focus of my life. The form of my own body became a more appropriate figure to represent the future connection of life processes with the earth. My bodily form is carved in materials from the earth in order to give life to other organisms. I would literally and figuratively grow new life. My sculptures would have lives of their own, growing changing, producing food, form, and thoughts during their lifecycle. *“Life dwells like a stranger in the flesh which by its own nature—*

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<sup>4</sup> Sacha Kagan, *Art and Sustainability: Connecting Patterns for a Culture of Complexity*, (Bielefeld, Germany, Bielefeld Transcript, 2011) 13

<sup>5</sup> Daniel Quinn, *Ishmael*, (New York, Bantam/Turner, 1992) 131

*the nature of the corporeal—is nothing but corpse, seemingly alive by favor of the soul's passing presence in it. Only in death, relinquished by its foreign visitor, does the body return to its original truth, and soul to hers.”*<sup>6</sup> Hans Jonas is speaking of the development of metaphysics and the evolution of thought about life and death. In early human thought, life was the natural order of things and death the issue. But as theoretical thinking advanced and knowledge moved to the heavens, and the concept of inanimate matter developed, life became to be seen as the anomaly in the equation of the universe, the thing that needed to be explained. These works deal with human life and how our connection with the Earth is continually changing. This body of works addresses death by transferring one organic material into the budding of another. It addresses death as a part of the life cycle.

The answer is not to deny technology, being a luddite won't change the realities of the world. I see technology playing a big role in improving our sustainability, efficiency and balance. I see technology and biology as being two sides of a coin to live more cohesively with the earth. I see them both as solutions to waste, pollution, and loss of natural resources. So while this thesis is about growth in a biological sense it is also about a growth of possibilities, ideas, and technology. This project is looking to the future where technology and biology work together to create solutions for the earth. Part of this future includes death, but new life rising from death. This comes into play in the form of mushrooms pulling nutrients from wood, a true decomposition being part of the

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<sup>6</sup> Hans Jonas, *The Phenomenon of Life: Toward a Philosophical Biology* (New York, Harper and Row, 1966) 13

artworks. But also in the sense of seeing my body broken down and transformed into other life forms.

Growth (in)formed takes into account current world issues of global environmental impact, food production, technological automation and mixes them with my own personal issues of fertility, mortality, and economy. The work exists in a state of flux that is particular to our current time and place, while looking to a future without me, with a more harmonious balance of life. A future in which my legacy is a stronger biological world that is still open to technological advancement. A world where my offspring can explore anything they wish while having clean water, healthy food, and a healthy planet.

The aspect of time is a large part of the context of the project. Time as it relates to the ecosystem, which is a long view of time. The ecosystem is as old as the earth, in constant flux, a complex mesh of interrelated systems. This work taps into that long view of time with earth materials that will last thousands of years in conjunction with organic materials that will last a season. *“Driven by the desire to strengthen the planet’s weakened defenses and preserve remnants of our planet’s vitality, these artists venture beyond conventional art boundaries into uncharted territories. They typically address issues that non-art professionals claim, create works that function like objects with no pretensions as art, conduct processes that do not resemble studio art practices, and share creative responsibility with non-artist collaborators. Another entry on this challenging list is provided by medium. Eco artists replace art store supplies with living plants and microbes, mud and feathers, electronic transmissions and digital imagery,*

*temperature and wind, debris and contaminants. The finale is that eco art is defined as a mission, not a style.*"<sup>7</sup> Each process points to a length of time relative to a species, a material, or a relationship. The relationships cross both species and generations; they move through time.

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<sup>7</sup> Linda Weintraub, *To Life!: Eco Art in Pursuit of a Sustainable Planet*, (Berkeley and Los Angeles, California: University of California Press, 2012) xiv

## Conception

The conception of this thesis is rooted in an experience, grown with an idea, and fixed with another experience. I began thinking about my thesis over a year ago. But my experience in Italy participating in the Digital Stone Project at Garfagnana Innovazione was really the event that began to shape my thinking about the thesis. In developing a design for the workshop I utilized new tools, techniques, materials, but also a new method. (fig. 16) I went through multiple designs and adjusted my concept before arriving at a work both conceptually and structurally sound enough to be milled in marble. This is in contrast to many of my earlier works which were made in a more intuitive and expressionist manner. This added criticality in preparing a work has carried through to become a part of my practice. So in the process of improving software skills I found a real interest in the programming and the technical aspects of milling sculpture.

This experience led me to a path of designing and preparing files for fabrication. The work became about technical challenges. I was focused on the object and the process in which it was made. But while being interested in this I wanted to have more impact on the world. I wanted to improve the world. I wanted to find an issue that I could have an influence on. *"...My intention: healthy chaos, healthy amorphousness in a known medium which consciously warmed a cold, torpid form from the past, a convention of society, and which makes possible future forms."* And in conclusion: *"This is precisely what the shaman does in order to bring about change and development: his*

*nature is therapeutic.*"<sup>8</sup> It is this idea of working on a relevant social issue, an issue that could impact society that I came upon aquaponics. Aquaponic farming is a system of agriculture in which water is pumped over the roots of plants that are suspended over an irrigation system. This system is combined with a fish tank and the fish waste helps to fertilize the plants. Benefits include a more efficient use of water, the ability to create a vertical gardening system which would use less land or allow for indoor growth, and a synergy between growing vegetables and farming fish. I worked to develop my own aquaponic system with the idea that it could be implemented in homes to increase water efficiency, provide vegetables to everyone and cut down on pollution produced by transporting produce. But in reality this became a design and engineering project about the formal aesthetics of already established systems. In essence I was trying to reinvent the wheel designing a system that already had hundreds of free designs online. My goal to improve the world would actually have little impact. This fascination with efficiency and social impact combined with design had led me to a crossroads.

At this crossroads another event intervened to push me in yet another direction; I found out I was going to be a father. I still wanted to address issues in the world, but the world became more focused, closer, and more human. I saw the necessity to apply the process of preparing work for Italy with the concept of growing food as artwork, but I needed the body to add humanity to this work. I brought my own issues and questions into the work by using my own form. Fertility and mortality are closely related; the reality of death makes us contemplate our ability to reproduce and vice versa. *"Throughout*

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<sup>8</sup> Jan Verwoert, *The Boss: On the Unresolved Question of Authority in Joseph Beuys' Oeuvre and Public Image*, 2008 <http://www.e-flux.com/journal/the-boss-on-the-unresolved-question-of-authority-in-joseph-beuys%E2%80%99-oeuvre-and-public-image/>

*human history, we have invested innumerable hours of labor in countless luminous visions of the afterlife, both physical and metaphysical: Heaven and Hell, family and nation, capitalism and Star Trek. We have children and pressure our children to give us grandchildren, sending our genes into the future. We build pyramids, cathedrals, temples, mosques, monuments, and skyscrapers to prove to ourselves that some part of us will survive beyond our own end.”*<sup>9</sup> We have a will to live that pushes us to try and survive longer than our bodies. We procreate, we build things, we create. Agriculture is a key to our personal and species survival. The body is a symbol of our power and our limitations. It allows us to move, manipulate, and create in the world and spread humanity. But it is also fragile, temporary, and destined to fail. The use of this form fits the concept of questioning my self as a creator of life, a steward of the earth, and a cultivator of sustenance.

It is not possible to talk about the conception of this thesis without addressing the events in my own life. There was a lot of struggle involved in developing this body of work. I struggled with the role of the art object, the intent of the artist, the role of narrative, my own mortality, and the uncertainty of the future. I was locked into ideas that led to dead ends. I started over after developing large works. I failed and failed again. The current project incorporates failure into the concept and acknowledges these past failures as integral to the development of the work.

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<sup>9</sup> Roy Scranton, *Learning to Die in the Anthropocene: Reflection on the end of a Civilization*, (San Francisco, California, City Lights Books, 2015) 90

## Development

Once I worked through the issues of design, content, and concept; I had my starting point, a collection of sculptures focused on the body that utilized digital production methods combined with grown biological elements. I still had to develop the specifics of artworks: pose, form, materials, and logistics. After almost a year of working and starting over, this process came surprisingly fast. I worked from the final concept to production extremely quickly. Production involved milling, hand work, and planting. The natural processes and time based elements of the work added complexity to the concept of the sculpture.

The work Dirty D began with making a full scale human figure. Starting with the pose, I researched the semiotics of what certain gestures mean. The form chosen holds a hint of movement and drama. This figure has a slight crouch, a bend in the legs, as well as a slight twist. The arms are extended but bent at the elbows, they move somewhat in cohesion with each other. The pose recalls someone in action, but what kind of action is unknown. I thought about Rodin's sculpture of Balzac, army men toys, and football players. (fig. 17) I knew this would be a full scale sculpture. I decided to carve it in foam. This would allow me to treat the surface with soil and work to grow grass on the sculpture. I looked at Gene Pool and Mathilda Roussel as influences for growing grass on a figure. (fig. 18) This mysterious man of action would become a part of the landscape. The earth would reclaim the figure and the materials. The logistical challenges included programming the robot, structural integrity of the piece, and the cultivation on a 3D surface. This project was my first programming job. Each piece was

programmed three times before milling. Once the piece was milled it needed some internal structure to stabilize the legs and base. Working the piece with soil and glue gave a base layer to the finishing of the work. Growing grass is a work in progress.

From the development of Dirty D I had a 3D scan of my body that I could use to cut up and arrange other pieces. I had to choose which body parts to highlight, what materials would conceptually work with the pose. I chose to use the lower half of the body. This is the body's base, connection to the earth, locomotion, and includes sexual organs. I wanted to use clay to reinforce the connection to the earth. Instead of milling like the other sculptures, I utilized 3D printing to additively create these sculptures. I went from a full human scale sculpture to creating 1/5 scale sculptures with this piece. I also wanted to explore multiples at this scale. The pose even more resembles little green army men as I designed a base to mimic the oval like base found on the toys. (fig. 19) This work is titled Seed Army. The idea of creating multiples of these little lower halves of men is a comment on male fertility. These little sculptures become pots to grow plants, so these little phallus wielding sculptures are abundant in number and are growing life from seeds. Claes Oldenberg said, *"I am for the art that grows in a pot, that comes down out of the skies at night, like lightning, that hides in the clouds and growls."*

<sup>10</sup> The size, scale, number, pose, cropping, and finishing all seek to reference male fertility. The finish of the pots is intended to reinforce the connection to army men. They hyper masculinity of the military is an issue for me. I don't see violence and machismo as solutions to the problems our world faces. By turning these camouflaged men into

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<sup>10</sup> Alex Danchev, 100 Artists' Manifestos: From the Futurists to the Stuckists, (London, England, Penguin Classics, 2011) 353

vessels I am highlighting the feminine within these figures as well. The piece is at once a celebration of the masculine and a comment on the limits of masculinity. Each piece becomes both masculine and feminine, which highlights how both are needed for reproduction, the survival of species depends upon both.

Next the concept for another piece featuring legs emerged. I was again thinking of them as our base, our connection to the earth, and our path to the future. My research in aquaponics had led me into other areas of agriculture and biotechnical exploration. In particular Paul Stamets mushroom research about their role in the environment as a fixer of soil, a network for nutrients, and a preserver of genetic variation within the forest. *“Mushrooms are very fast in their growth... Mushrooms produce strong antibiotics. In fact, we're more closely related to fungi than we are to any other kingdom. A group of 20 eukaryotic microbiologists published a paper two years ago erecting opisthokonta -- a super-kingdom that joins animalia and fungi together. We share in common the same pathogens. Fungi don't like to rot from bacteria, and so our best antibiotics come from fungi. But here is a mushroom that's past its prime. After they sporulate, they do rot. But I propose to you that the sequence of microbes that occur on rotting mushrooms are essential for the health of the forest. They give rise to the trees, they create the debris fields that feed the mycelium.”*<sup>11</sup> It is from this quote that the title of this piece originates: The Foundation of Animalia and Fungi. I decided I would find oak logs, carve them, inoculate them with spores, and harvest mushrooms from these living sculptures. I came to think about mushrooms as another way to connect my

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<sup>11</sup> TED Talks, Paul Stamets, 2008 [https://www.ted.com/talks/paul\\_stamets\\_on\\_6\\_ways\\_mushrooms\\_can\\_save\\_the\\_world](https://www.ted.com/talks/paul_stamets_on_6_ways_mushrooms_can_save_the_world)

sculptures to the earth and to food sources. I found that shitake mushrooms grow well on oak logs. (fig. 20)

This was the most technically challenging piece to make. The logistics involved acquiring raw oak logs, mushroom spores, designing an armature, and learning proper technique for milling wood with the robot. To acquire the logs I travelled to Massachusetts where I documented a logger using a new machine. (fig. 21) I photographed the logger using a forestry harvester, a machine that grabs a tree, cuts it down, and then de-limbs the log all in one motion. I bartered a day of photography for a truckload of logs. The logs were then 3D scanned and the 3D model was augmented to fit the logs. Mortise and tendon joints were designed into the leg pieces so they could be assembled post milling. An armature was required to secure the logs to the bed. This heavy duty wood, steel, and lag bolt armature was essential to keep the logs in place. Milling hardwood requires carbide bits and the correct technical specifications. Multiple woodworkers and toolmakers were consulted. Once I had all this ready I worked to program the cuts. I milled the legs and carefully shaped them to fit together. The legs feature finish milling marks and raw bark, a symbiosis of the aesthetic I was looking for. But there is still more to the process of this work. (fig. 22)

Once the legs were assembled I needed to inoculate them with the mushroom spores. I had ordered the shitake spores from Paul Stamets' website. The process involves drilling holes throughout the log and gently tapping the plugs into the holes. (fig. 23) Then beeswax covers the plugs and any raw wood where bark was removed. This process led to a knobby, lined sculpture covered in drippy yellow wax. Next the

sculptures had to soak in covered cans with water. The moisture was needed to run mycelium through the wood grain. After a few months of monitoring the moisture of the logs indoors, I took them to the woods. I am documenting their progress along the way. The goal is that they will fruit in time for the exhibition. The two legs are displayed standing vertically, arranged in a line suggesting walking a path. They are meant to invoke the movement of time.

The arms are also a part of the body that contain a significant symbolism and formal interest. Where the legs are the foundation, connection, and locomotion for humans, the arms are the workers, sensors, and actors of our body. The arms and hands allow us to communicate, touch, and manipulate the world around us. With the arms I chose to explore another fungus material. I had been reading about artists, designers, and architects using mycelium as a structural material. People like Phillip Ross, Erick Klarenbeek and Marina Zurcow. Each has used mycelium in a different way, Ross concentrating on it as an eco building material. (fig. 24) Klarenbeek is using it as a structural element in 3D printing organic inspired furniture. (fig. 25) Zurcow is an eco artist who uses 3D printing and cast mycelium to transform symbols of international shipping and petrochemical products into biodegradable doppelgangers. (fig. 26) I saw the potential of growing sculpture with this material.

The logistics of Myco Action are another challenge. The process started with a 3D scan which was digitally manipulated. These scans were programmed and milled with the robot. Once the arms were milled and assembled, silicone molds were made of the arms. These silicone molds were then used to cast the mycelium material. I found a

company called Ecovative Designs that sells kits which contain corn husk and mycelium. It is a two to three week process to prepare the mycelium kits, they require water and flour to activate the spores. The mycelium grows, then you break it apart and press the material into your mold. You wait another two weeks for the mycelium to regrow. The piece comes out of the mold a living network of mycelium. At this point the piece can be kept alive to continue to change or dehydrated to create a strong foam like material. I chose to dehydrate the mycelium. But even when attempting to dehydrate the mycelium I don't believe I killed it. The sculptures appear to be browning and changing still. The failure rate is quite high for this process. I ended up with many discards. The problem is having the right environment for the mycelium. It needs to be moist, but get enough air. It is a challenging material to work with.

Three arms were successful, they are displayed suspended from the ceiling. They are arranged in a line that evokes a line of motion. The arms are headed for another suspended element. This element is a dried pineapple. This pineapple has similar colors to the earthy tans, browns, and whites of the mycelium arms. The dried pineapple displays the structure of the fruit. Each node on the pineapple shows the pattern of its growth, thus this dried pineapple is a preserved evidence of how it grew. Pineapple growth was a theme in my work "Sacred Growth, Fruiting Column" the work carved in marble in Italy. It focuses on how the fibonacci spiral describes the growth pattern of the pineapple. The work connects math, science, and technology. This thinking about pineapples and growth is a very early germ in the concept of my thesis. But this pineapple is dried, tired, and holds no nutrition. It is a dead form, it must symbolically be allowed to decompose. The work is speaking of the cycle of life with

death being necessary for new growth. It also pertains to ideas, old ideas can inform our ideas, but some ideas have to die and be decomposed in order for new ideas to flourish.

Fertility, reproduction, and growth rely on more than just one body. They require partners, relationships, and interaction. The bulk of the works focus on the masculine, but there is a part of my process that needs to address the feminine. I can insert it subtly into some works addressing my body and my own experiences. But I also feel I need to address some of the feminine experience more directly. I started talking with my wife about making a work about pregnancy. Our research led us through many art history books, looking at classical, renaissance, and contemporary art, leaving us with very few depictions of pregnancy. There is the Arnolfini Portrait by Jan Van Eyck (fig. 27), Verity by Damien Hirst (fig. 28). Even most Annunciation and Madonna and Child artworks skip the pregnancy depictions altogether. There is more focus on having pregnancy photos and pregnant celebrities in bikinis make the internet buzz today. (fig. 29) But pregnancy seems to be a tough sell in the arts. Stephanie was up to modeling for the work, but she wanted to participate in choosing the pose, research, and helping to shape the meaning of the piece. We came to Botticelli's The Birth of Venus as a symbol for fertility and beauty. (fig. 30) We wanted to take this iconic pose and insert the beauty of motherhood instead of the worship of youth. I 3D scanned Stephanie in this pose, adjusted the model, programmed and milled the sculpture in wood. I chose maple to carve for this work and the title became Maple Mama.

This work is displayed at the center of the room. It is placed on a wooden pedestal becoming the tallest object in the room. It is surrounded by the seed army, each ceramic pot sprouting green vegetation directed at the female figure in the center. The ceramic figures are on wooden pedestals of different heights, but they are all low to the ground. The grouping suggest both worship and attack. The Maple Mama is already impregnated but she is surrounded by little phallic vessels. These vessels are on the attack, but they are too late and they are also somewhat comical as they are themselves something feminine with their vegetative growth sprouting forth.

In addition to these sculptures will be documentation of the processes involved in making them. This includes hundreds of photos of milling, hand work of materials, and natural processes occurring over time. Each element of the thesis is an act of learning. The technology used is all new processes in my practice as well as the different organic processes.

## Conclusions

I have learned a lot during this project. The biggest takeaway I have is one of personal growth and expression. I have been open with my life, body, and issues that I care about in this process. At the same time I have learned new skills, explored new materials and techniques. I have learned to control development, design and fabrication of artworks in multiple materials. Increasing my focus and control on concept and execution. But at the same time I have given myself room to allow for chance, time, and nature to change my work, and change my life.

I have come to the conclusion that life in any form is extremely difficult to control. There are so many factors involved in fostering healthy life that are out of our control. *“Natural talent may partly explain why one might choose to become a novelist instead of a musician or a painter, but talent itself—whatever indeed constitutes it—is likely unconcerned with material form. Happenstance has a greater role to play in an individual’s creative fortunes. And such serendipity isn’t limited to one’s natural gifts; it also extends to the accident of timing.”*<sup>12</sup> The chance that I allowed to be a big factor in my artwork left room for failure. Failure won the majority of the contests. Nature and other organisms don’t care about my plans. Time has no regard for me. The thing I am best at, that I have mastered is failure. I can fail at anything. I keep on trying, I don’t let this failure stop me from trying. I don’t let failure keep me from exploring. But if I have mastered anything during this process it is knowing that I will fail and continuing the process.

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<sup>12</sup> Ian Bogost, *Alien Phenomenology, or What It’s Like to Be a Thing*, (Minneapolis, Minnesota, University of Minnesota Press, 2012) 87

Connecting with the earth, technology, and yourself are full time jobs. The cultivation of life and relationships requires your full attention and energy. My exploration of myself has led to a better acceptance of my own limitations both physically and mentally. I accepted my body for its flaws and presented it in multiple versions. I also accepted the failures of my physical prowess in sculpting and cultivation. My mental limitations are rooted in my perception of myself versus the reality of my ability and intellect. I am continually failing to live up to my expectations. I don't know if I have improved upon this, but the feeling of failure is constant. It permeates through each of my projects. I have allowed this failure space to exist in the artworks, and the failure has filled that space. My biggest worries weren't alleviated with this project, they were reinforced. I worked to shape this failure into something else, something people could connect with, something that had another message attached to it. Maybe by addressing eco art, we are addressing failure. Humanity's failure to see past itself. We can see the failure of capitalism, but fail to abandon it.

These thoughts on failure are a reflection of our mortality. We know we will die, which feels like a failure. We cannot prevent this, just as we cannot prevent the deaths of others. We strive to affect change, but accept the futility and count the slightest most imperceptible change as a victory. This project began with a hopeful view, a future forward, problem solving, personal insight view of the world. The goals are left unattained, the natural processes in various stages of ineffectiveness. Plants and fungus not thriving. I accept these failures, and can live with them. I do not look at these failures as negativity. I still have hope for the future. I still look to solve problems. I still strive to have a stronger connection with the earth. I can still use technology and biology

to explore and experiment with form, design, engineering, and aesthetics. I see these failures as the stepping stones to improved knowledge and the possibility of a better outcome in the future.

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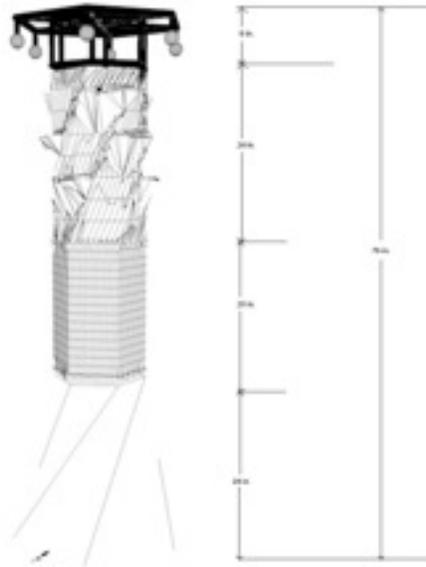


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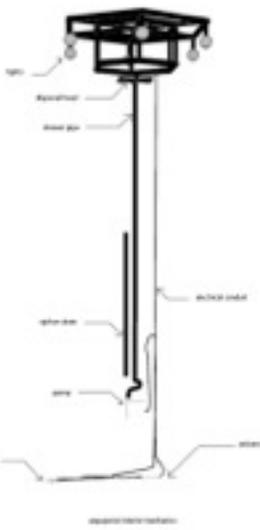
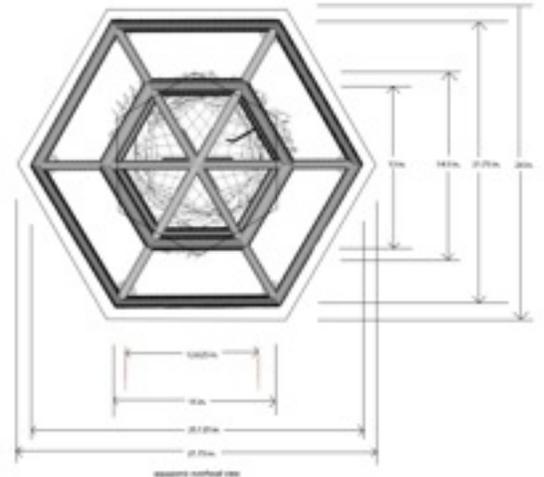


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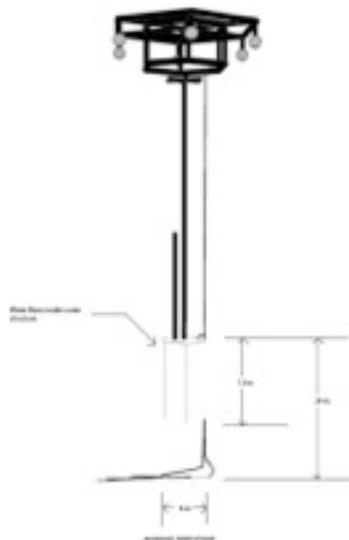
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  - 7. wire (20)
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  - 10. subframe
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  - 12. waterproof tape
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Hexagonal vertical garden



Hexagonal vertical garden

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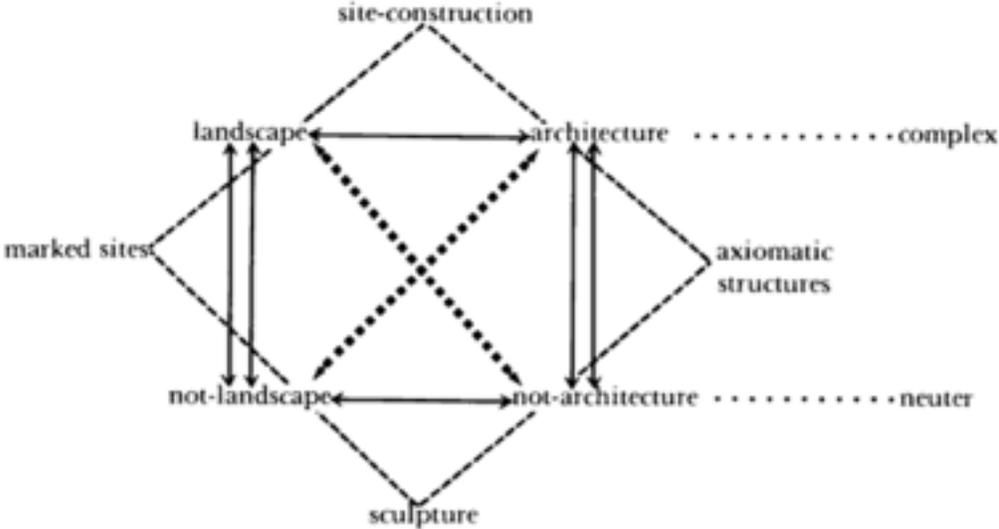
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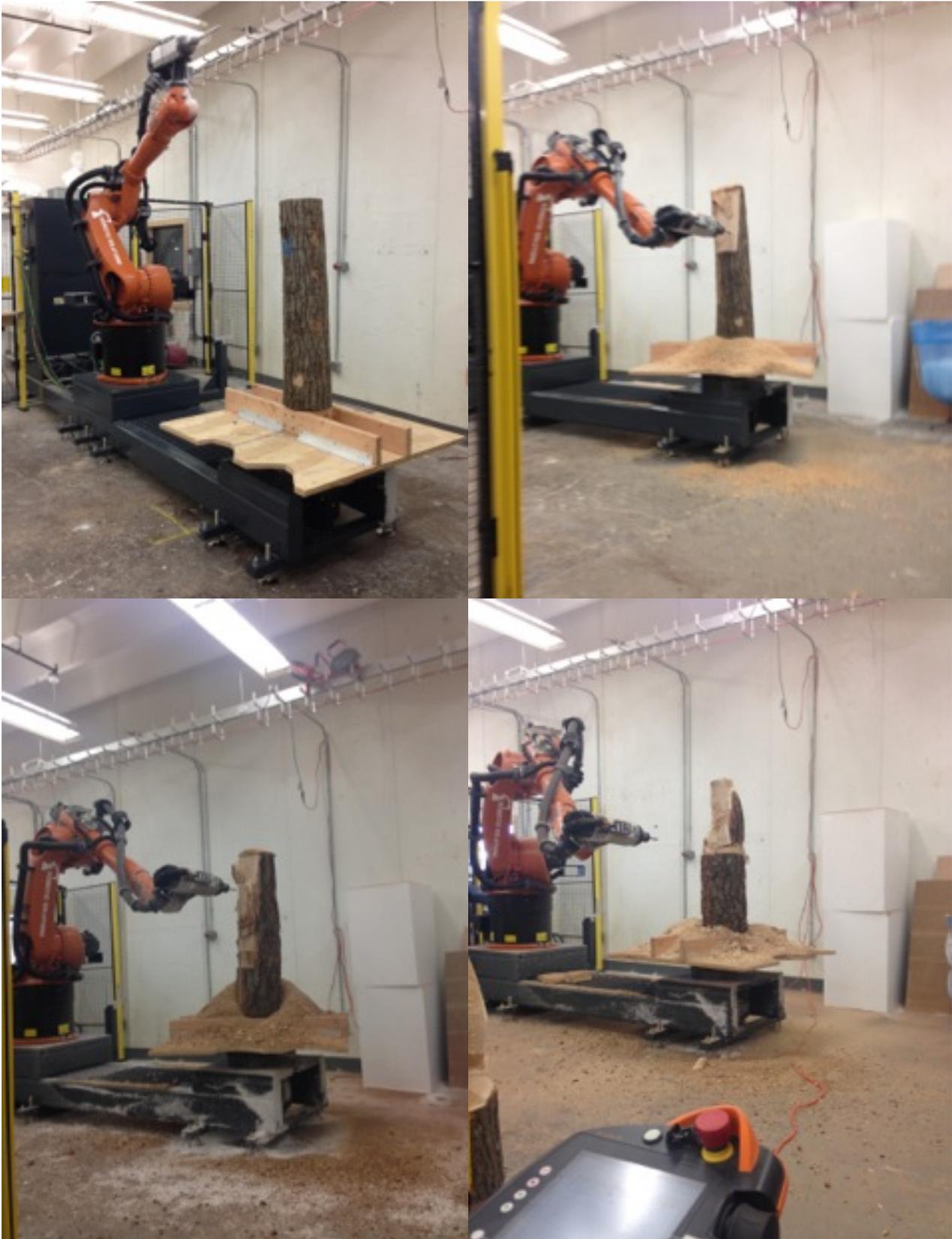
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