INTERSPECIES

INTERSECTIONS

DANA MICHELE HEMES

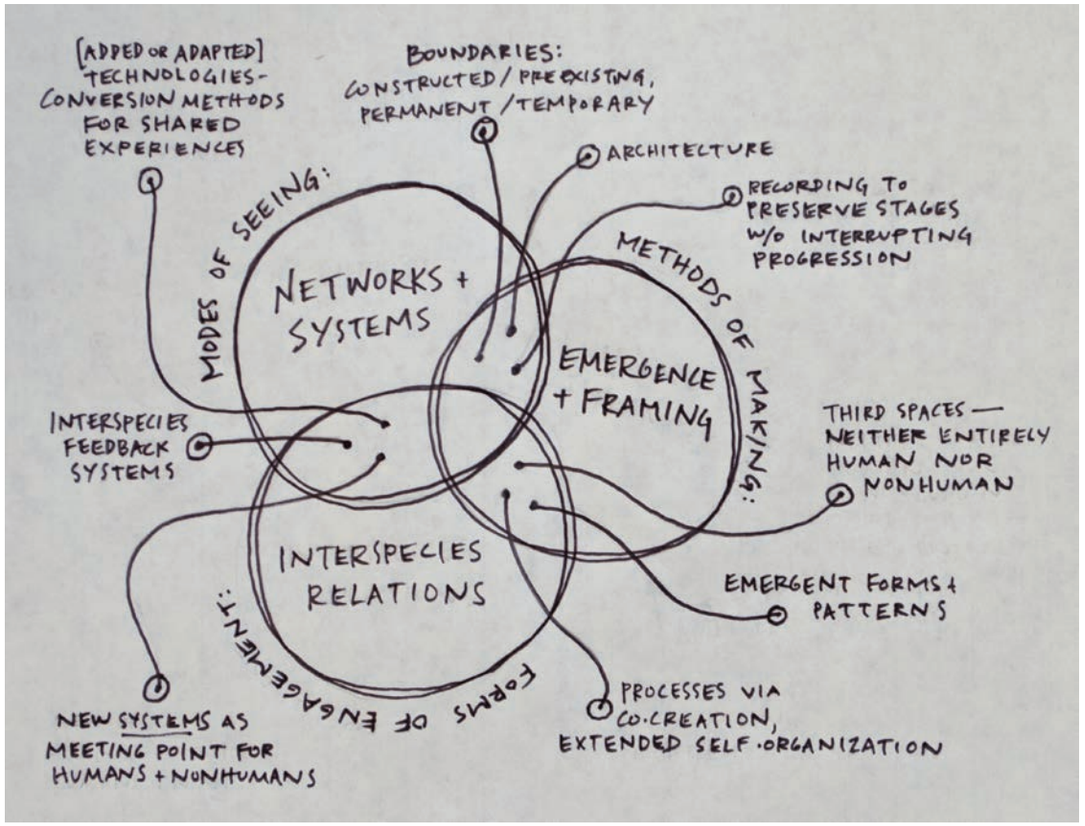
EMERGENT PRACTICES, BEYOND THE HUMAN

The world is a complex system made up of many, small interactions, which produce endless patterns and forms. Each moment is an event: an active, participatory state where all parts of a system affect and are affected. These parts are living and nonliving, human and nonhuman. I develop an art that locates itself within these events and works directly on their terms. It is an art of systems, evolving boundaries, scale-shifting, stimuli conversions and multiple nonhuman actors.

I strategically and experimentally take a non-anthropocentric viewpoint to engage with these fluid environmental states. Treating all parts equally, I mirror actions: any experiment or analysis done to one species is done to all participating species. This facilitates a practice of shared, emergent experience, as a constructed environment of living and nonliving parts. Complex dialogue ensues. An example: ants and humans share different forms of sound perception. My work brings these qualities together through speakers that amplify ant movements to human audibility, and motors that convert human sounds to vibration so ants can 'hear' through the subgenual organs in their legs. The shared sound experience results in an emergent, interspecies intersection.

The events are partially open systems, demarcated by (often permeable) pathways and boundaries that include but are not limited to: walls, museum-stanchions, smells, humidity, bricks, temperature levels, nylon, spices, and various types of light.

Each system-work evolves as it moves into new locations, changes size, and/or gains and loses components, forms, co-creators. Emergent properties reveal themselves and the process continues.



ENVIRO-TECHNO SYSTEM WORK(ING)S

What happens when human culture not only meets nature, but is created with it? Complex systems make up the world, causing it to function in a constant state of shifting. These systems include all active non-living and living parts, both human and non-human. Technologies are implemented to create conditions that enable multiple species to co-exist and simultaneously experience. Human and non-human tools expand receptor capabilities, conflating seeingly separate events. By bringing living organisms (bacteria, roaches, ants, etc.) into the making process, and providing adapted spaces for interspecies interactions, the work is no longer exclusively for or by the human.

Making manifests from working with the forces in these systems. The work moves away from the object and toward functioning system-works. Living and nonliving parts are displaced and positioned together in new systems and set in motion. I look for emergent patterns and forms, using self- and co-organization as a basis for making. Methods of seeing, methods of understanding, and co-creating are central to this working process.

The ideas that underlie these three areas have precedents in process philosophy. Bruno Latour, Gilles Deleuze, Elizabeth Grosz and the work of Meg Webster support new *modes of seeing*; in the *methods of making*, artist Simon Starling and architect Frei Otto; and the *interspecies relations* introduced in the work of Natalie Jeremijenko and Ken Rinaldo, Donna Haraway, Eduardo Kohn.

[MODES OF SEEING] NETWORKS & SYSTEMS:

Bacterium/Homo 2-18, Phase 2 *is a process work that was created during a five-week residency at the Whitecliffe College of Art and Design in Auckland, New Zealand.*

Upon my arrival in New Zealand, after stating on my customs card that I had recently been in a forest, my shoes were taken from my suitcase and cleaned by airport personnel. This direct connection—shoes as a receptacle for the transfer of potentially harmful matter—along with my personal state of temporary displacement set the concept and the duration of the piece.

BACTERIUM/HOMO 2-18, PHASE 2, 2013. OVERVIEW*

Each day I mapped where in the country I had traveled, and I swabbed a bacterial sample from of the soles of my shoes. These samples were brought back to the studio and cultured on square sheets of clear acrylic, coated with a nutrient agar medium. The microscopic bacteria began to colonize, becoming visible to the unaided eye. Within days the panels were covered with patterns and colors of different types of bacteria.

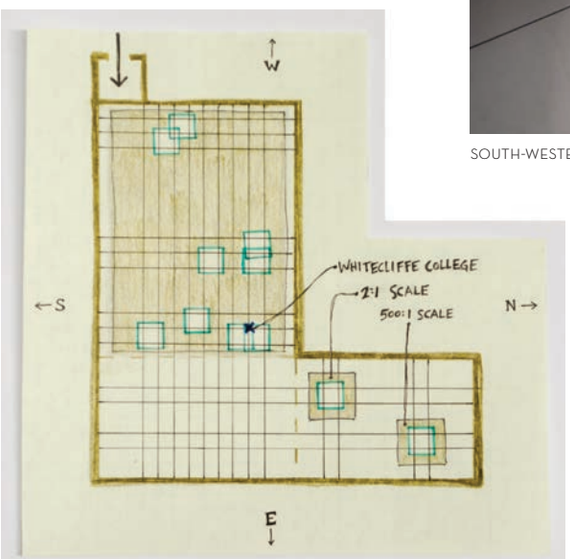
The living panels were installed at Whitecliffe College, hung overhead on a suspended grid. I placed the panels on the grid in relation to their distance and orientation from the school (the site of the installation) marked in the room as an "X" on the floor. The amount of growth on each panel determined the chronology of my time in New Zealand: the denser the growth, the earlier the visit, where as little amounts of growth marked a very recent destination. Spotlights above each panel cast shadows of the bacterial growth down onto the floor and onto the audience. The shadows touched the viewers but in a nontangible way—similar to the way in which microorganisms exist on our bodies.

As the amount of panels increased, a pattern or shape began to emerge. Some areas of the wire grid became dense while others remained bare—this emergent patterning developed from my own tourist interests, locations of where I collected supplies for the installation and also from where my hosts chose to take me.

By conspiring with these ideas and forces, the work becomes unstable; it is in a state of motion and can take many forms. In this case the nutrients in the agar were transferred to iridescent colors of the bacterial growth. The light casts shadows, filling the room with patterns. The gases in the air were pungent and a combination of human and bacterial.

*TITLE GUIDE:
[*NONHUMAN GENUS*]/[*HUMAN GENUS*] [*BATCH #*], [*LOCATION #*]

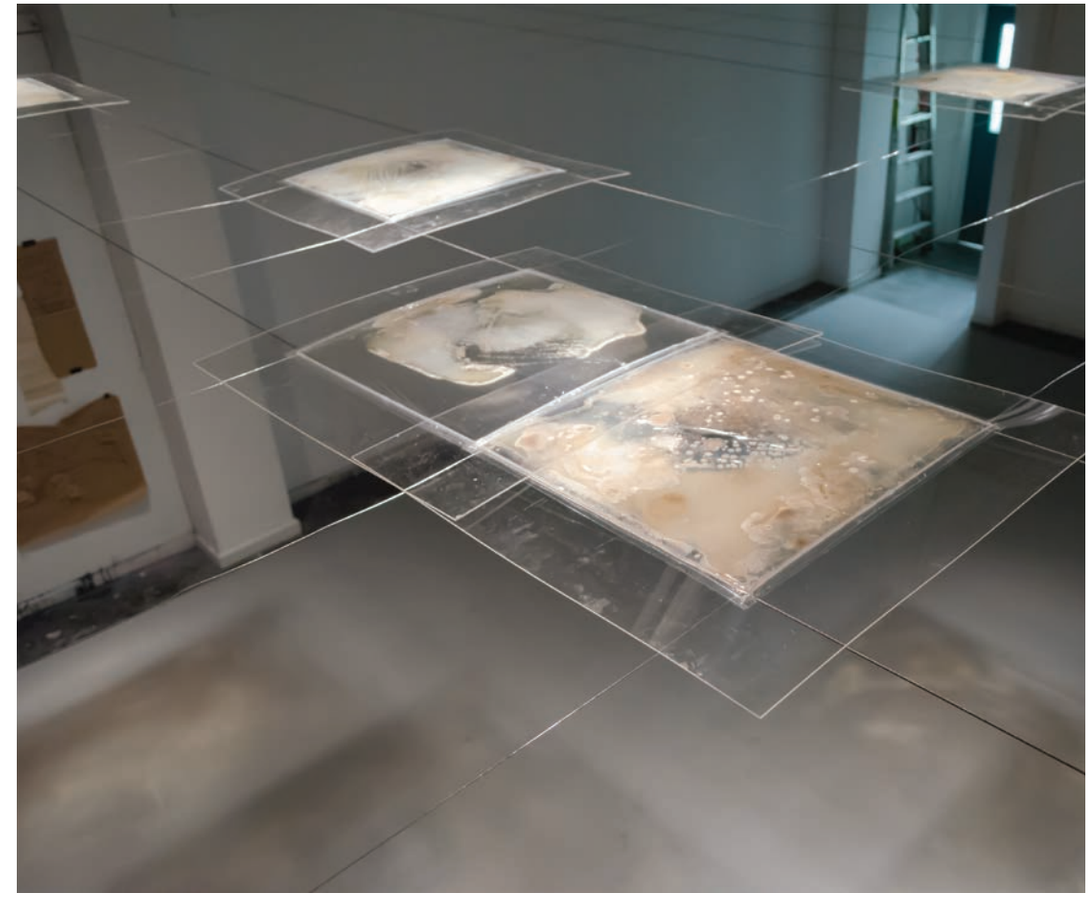
SOUTH-WESTERN VIEW



WHITECLIFFE COLLEGE INSTALLATION FLOORPLAN

NORTH-EASTERN VIEW

MAPPING AND SWAB SAMPLES



VIEW OF SOUTHERN WALL WITH CAST SHADOWS ON FLOOR

BACTERIAL PANEL DETAILS

For Bruno Latour the function of a system disregards the human/nonhuman divide. He states, "everything happens in the middle, everything passes between the two (humans and nonhuman, nature and culture), everything happens by way of mediation, translation and networks, but this space does not exist, it has no place."[1] Here Latour explains that the connections in a network are all internal rather than two separate sections, severed by distinction— instead of "human and nonhuman," there is only one. There is no middle emptiness in which things pass through. Change comes about by many immediate interactions between neighboring components within one functioning space. Latour along with Michael Callon, describe systems by means of the Actor-Network Theory (ANT), an active interaction in which both humans and non-humans affect one another.[2] The terminology devised for the ANT is a useful tool to break down and understand individual components of an active, physical system, as well as a means for making.

Latour uses the terms of actors and actants to describe the things that make up the world—they have concrete properties, they are specific to a moment and they are always events. Actors and actants make up the parts of a system, the components. Actors are affecting, while an actant is being affected. The texture of my shoes, my hosts, the agar, the bacterial samples, the temperature of the room are all actors/actants. They are brought together to affect and be affected, resulting in a living event, specific to a duration of time and a place. The microscopic bacteria actor is displaced from various locations, scraped from my shoe actor and placed onto the agar actant. The live bacterial actors change the agar and the agar allows them to grow, changing the room temperature and filling the installation space with an odor.

Jane Bennett expands upon the ideas into the agency of materials—both human and nonhuman—and the ways in which they affect one another. She describes matter as being vibrant. By vibrant she means something other than a stable state. All matter is vibratory, meaning that it is unstable in the sense that it too is in constant flux, an event, constantly causing affect and being affected. If living and nonliving things are looked at through their state of materiality, all parts of the system shift to an equal level, focusing the attention away from a being-hierarchy and toward the complex entanglement of the network.[3]

When everything is viewed as matter (as actors and actants) and is analyzed through its materiality, it becomes easier to see the transfers in networks and sub-networks and sub-sub-networks. The world loses its hierarchy, and all components become equal as participants in a set of networks within the membrane of interaction. All matter becomes active in the formations of states. The artist is no longer separated from the work, they are instead part of the system. Similarly, viewers can never passively look; they are always part of the system.

Meg Webster's *Pool* is a site-specific, functioning ecosystem. It exists in a museum context. Live, organic actors (koi, aquatic plants, algae, water, etc.) are brought indoors and are sustained with manmade actors (grow lights, water pumps, tubing, etc.). The hybrid environment questions the division between natural and manmade. The architecture displaces the "natural" from the outdoors to the indoors, where technology is needed to sustain it– bringing the seemingly separate actors together so that they function together. All actors are changed and changing as the events unfold, but they all exist at the same time and in the same place, with no divide. Webster's piece uses the gallery (another actor) to present the functioning system, the work(ing).

POOL, 2013 (ORIGINALLY COMMISSIONED FOR PS1 IN 1998)

[METHODS OF MAKING] FRAMING & EMERGENCE:

Pogonomyrmex/Homo 5, Phase 3 *is a gallery-based system-work that uses forms of self-organization to question how multiple species (ants and humans) can exist in a shared environment. Boundaries (temporary and permanent) and pathways (for humans or for nonhumans) are tested as a means of observing movement through space.*

There are two systems: one is a partially closed system and the other is an open experimental zone. The closed system is a six foot tall black box, raised on a pile of gravel and surrounded by concrete, human-scaled stairs. The bottom of the box is filled with various types of sand and 500 ants. Harvester Ants are chosen as the nonhuman species for their abilities to self organize.

In the closed-system box of *Pogonomyrmex/Homo 5, Phase 3*, leading up from the sand and attaching to the ceiling are branching string-structures (following the self organizing techniques of Frei Otto) that are crystallized with sugar. These serve as both vertical pathways and as a food source for the ants.

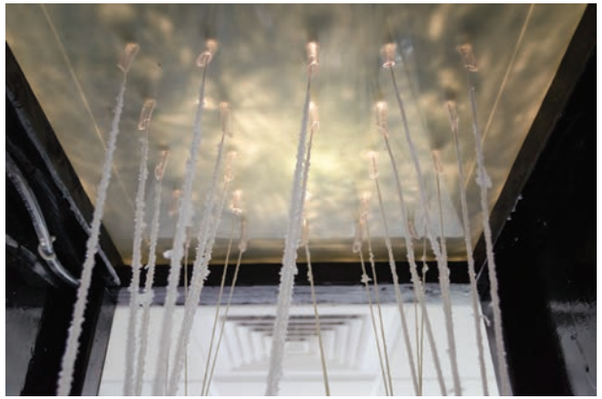
The four walls of the box are fitted with different materials, offering varying degrees of containment. One side has a hole cut out, so a human viewer can lean into the ant space. Another has a window made of nylon—the nylon acts as a temporary boundary, as the ants can chew through it after a certain amount of time. A large panel of clear vinyl material offers a malleable texture and light to pass, and finally a small acrylic window reveals the tunneling progress beneath the surface of the sand.

POGONOMYRMEX/HOMO 5, PHASE 3, 2013. OVERVIEW: (CLOSED-SYSTEM IS PICTURED ON THE RIGHT, OPEN-SYSTEM EXPERIMENTATION AREA ON THE LEFT)

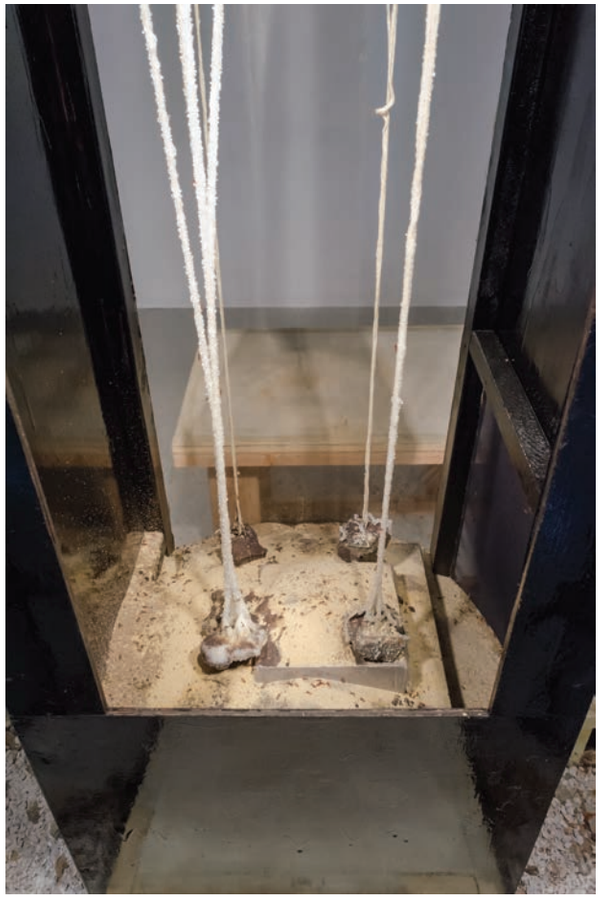
The experimental, open-system section extends throughout the rest of the room. Lines of cayenne pepper and cinnamon powder trace large areas. These spices serve as temporary boundaries, a material which ants are resistant to for a limited time, until the spice loses potency. These lines also question the viewer and their role in the piece. To see the installation fully, one must step over the lines, so that both ant and human exist within the same space. Other experimental tools include various types of lights, heaters to distinguish areas by temperature, and microphones.

The box contains various sorts of frames. It limits the actors and actants, but these can change since the sides are (semi)permeable—actors are allowed to enter the systems by means of various windows. Lines of spices frame the open-system. The gallery frames the open/closed-system experiment as a whole, and all other framing devices are contained within. However, the gallery is a partially open system. At certain times the doors are open and human and nonhuman actors can enter from outside.

Pogonomyrmex/Homo 5, Phase 3 uses the gallery as a frame to hold other framing devices. The events are ongoing throughout the duration of the gallery show. Afterward the system exists via photo documentation and the system parts are dissasembled and repurposed into new works.

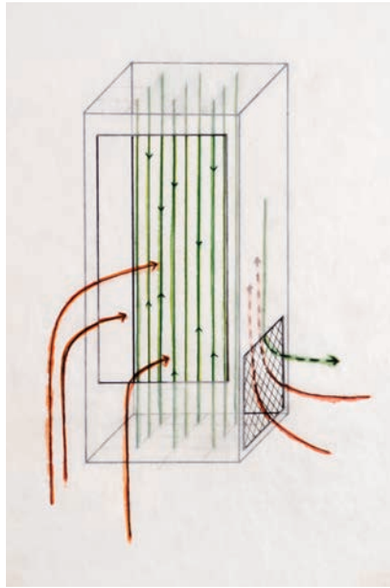


DETAIL OF ANTS ON CRYSTALLIZED-SUGAR, FREI OTTO STRUCTURE



INTERIOR OF CLOSED-SYSTEM

CLOSED-SYSTEM ALTERNATE VIEW



CLOSED-SYSTEM FLOW SKETCH

OPEN-SYSTEM EXPERIMENTATION AREA


HEMES

A basic definition of a self-organizing system is where many simple interactions create a complex whole. Organisms that are part of a self-organized group are categorized by simple functions and basic interactions, which create a much larger network when multiplied. Some of the organisms within this category include: schooling fish, bark beetles, fireflies, bees, wasps, termites, molds and bacteria, and ants only to name a few. Non-living examples of physical self-organization include wind ripples in sand dunes, convection cells and crystallization patterns.

Frei Otto, a German architect most commonly known for his tensile structures, implements physical self-organization as a means of finding form to translate into architecture. In one experiment to produce columnar structures, he uses string and water to create self-organizing, branching structures. The wool threads are translated into columns by a simple set of guidelines. If there are single threads, then it generates a single column. If multiple threads merge, then the column is thick. Frei Otto calls this process to "find [a] form."[4] The water (actor) causes a translation of the distribution of the wool threads (actants), leading to a bifurcation. The behavior, the materials and the structure each act with their own agency, but affect one another to produce an emergent form.

Elizabeth Grosz, expanding on Gilles Deleuze's notion of the frame, describes it as something that establishes territory out of chaos. By describing building as the "dividing up of the space of the earth,"[5] she states that architecture, the most primordial art, creates a frame with walls that distinguish an inside and an outside, and windows that select portions of the outside and let them in. This limitation or distinction leads to the production of a plane of composition. Having awareness of how boundaries and frames affect events provides the opportunity to work with these tools. Systems have edges; there are limits to how far they reach. Complex networks are made of many overlapping systems, sometimes making it difficult to distinguish one from another. Frames are used to distinguish these edges, making the motion of the system clearer. The results are visible forms and events not bound by the limitations of concrete states.

Emergence is fundamental to my making. It is the tendency of complex systems and patterns to arise out of multiple, simple interactions. An irreducible system (meaning that it functions at a level that is more or higher than the sum of the components) is emergent. An emergent property cannot be fully understood by examining the individual components of the system. Instead, the network or the interaction between the

components is central to understanding. All of the components within the system interact with each other, although not necessarily directly. As processes unfold, materials and organisms respond to one another in unexpected ways, causing shifts in trajectories and surprising forms or patterns. Since I make by becoming part of a particular system, I must work with other forces, looking for unexpected patterns and forms. The nature of how these forms arise prevents any completely predictable outcome, staying true to self-organizing processes that follow forces in systems. I activate existing architectures and construct my own creating the potential for new emergence.

Simon Starling constructs and deploys systems, drawing from historical information, physical travel and cyclical processes. The process is the work. The process includes research, building, activating, documentation, observing, etc. These continuous process steps often reveal other events, creating a complex chain of interrelated moments. The chain emerges out of the research and the making.

In 2006, Simon Starling created a (net)work entitled *Autoxylopyrocycloboros*. A wooden craft was resurrected from the bottom of Loch Lomand in Scotland. Starling found the original owner, and together they restored it to working order. A wood-burning steam engine was installed on the boat, and it was then launched in Loch Long. The wood from the newly-repaired structure of the boat was slowly stripped and fed to the boiler to generate the steam power. It was both vessel and fuel. As the boat moved along it consumed itself, compromising its own structural integrity and finally sinking, returning to its underwater resting place. The networks of the machine: the wood→fire→steam→power→movement and the lake bottom→land→lake surface→lake bottom, are used to reference the potential for an auto-destructive future held within Loch Long—a home to submarines that carry nuclear missiles.

All of these networks are made up of components (some physical and some metaphorical) that overlap and interrelate, producing an emergent outcome. As Starling uncovers a new system part, he follows it. The network extends as far as he follows. The work is the process– the process includes the physical boat cycle as well as the research and steps leading up to and following it. The

final result (the re-sunken boat) is incidental when taken out of context. Starling documents these processes in ways that provide enough information and are still in line with the concept. *Autoxylopyrocycloboros* currently exists as a set of medium format color transparencies and a projector. The antiquated projection machine mirrors the antiquated technology of the steam engine.

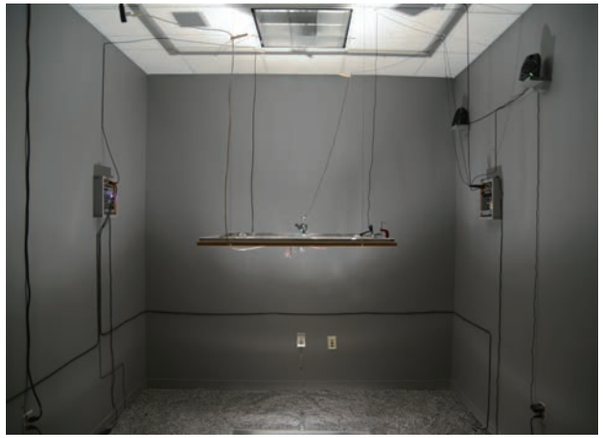
Starling uses the lake to frame the boat within a rich historical territory. The boat itself frames the auto-destructive event. And the slides frame the event in a way for it to exist in a gallery space for public consumption.

AUTOXYLOPYROCYCLOBOROS, 2006
3 OF 38 MEDIUM FORMAT COLOR SLIDES

[FORMS OF ENGAGEMENT] INTERSPECIES RELATIONS:

Pogonomyrnex/Homo 7, Phase 5 *is a work questioning how multiple species can share an experience.*

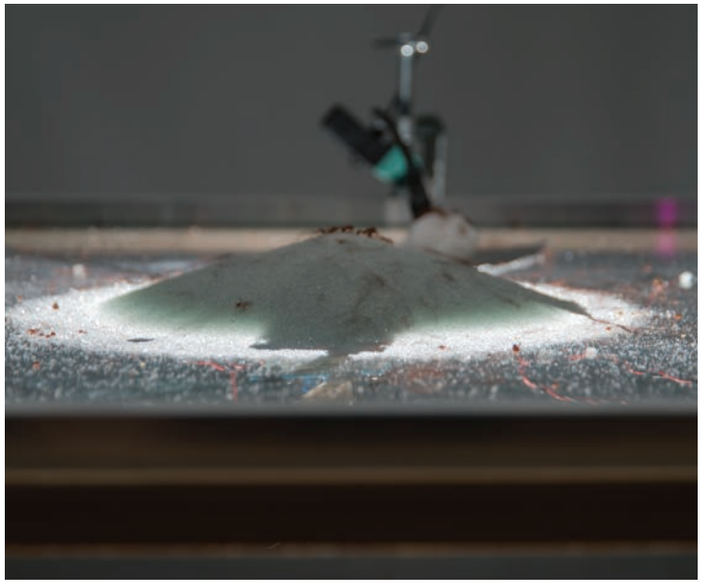
Again, Harvester Ants and humans are the two species in relation. This work focuses on a particular stimulus that both species are able to perceive: sound. While humans hear sound through their ears via sound waves moving air, ants hear through subgenual organs in their legs. Vibrations travel through material where they are picked up by the feet and then translated to hearing.



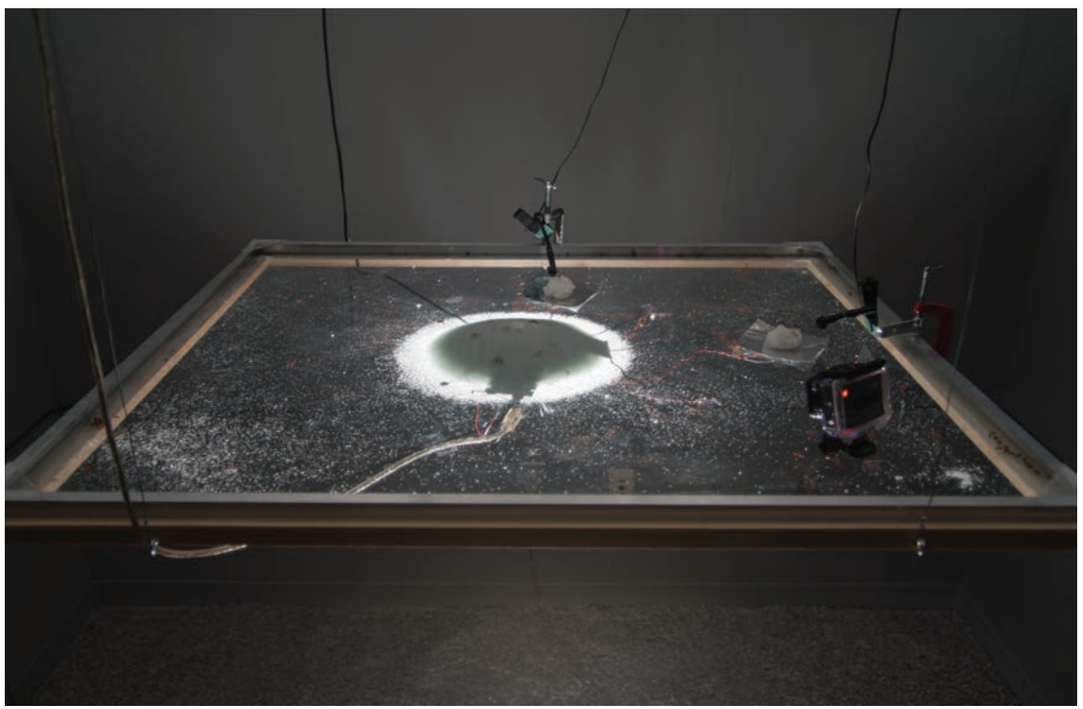
POGONOMYRMEX/HOMO 7, PHASE 5, 2014. OVERVIEW

Gravel fills the floor of a small, grey room. Microphones are embedded in the gravel, picking up sound from humans walking through the space. The sound is sent to a preamp and then to a simple computer where the level of noise is translated to vibration motors on the underside of a glass panel (the louder the sound, the more vibration motors are activated). Ants are contained on top of the glass panel, moving through a glass microsphere substrate. Condenser microphones pick up minute sounds of the ant movements and amplify them to human audibility. The ants hear our movement via vibration on their floor panel, and humans hear ant sounds through speakers in the airspace. Both species are hearing each other, but in their respective modes of perception. Both are observed and observing. *Pogonomyrmex/Homo 7, Phase 5* is human and ant activated. The piece rests when only one species is present. When humans enter the space the vibration stimulus sets the ants in motion, causing them to make sounds which are amplified. The humans and ants are linked in a process, a direct system, that can only take place when both species are present.

The shared-environment becomes a new space, adapting the sound experience to the needs of both participating species.

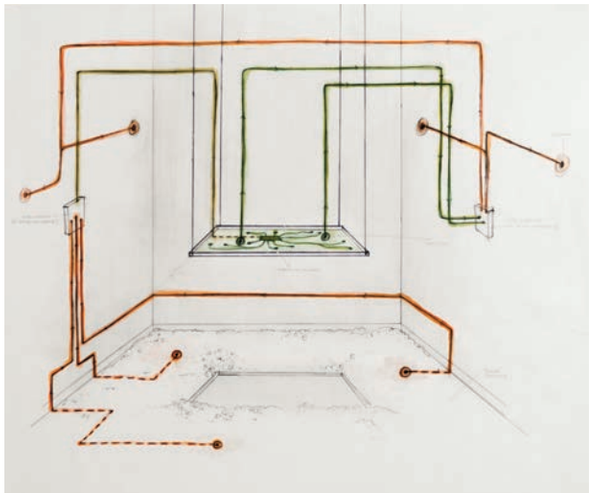


DETAIL OF ANT ACTIVITY ON PILE OF GLASS MICROSPHERES

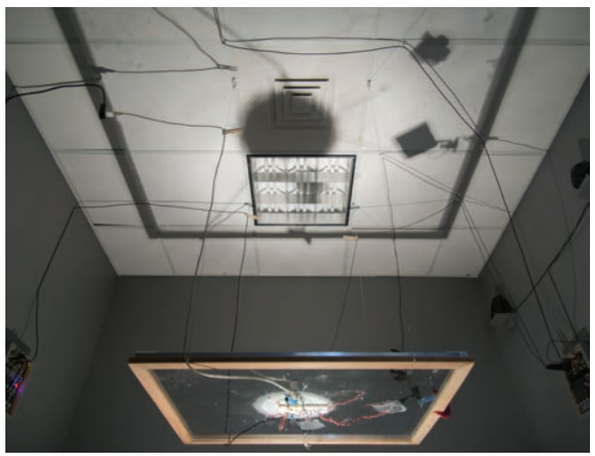


DETAIL OF PANEL TOP SURFACE: MOUND OF GLASS MICROSPHERES, SATURATED COTTON WATER SUPPLY, TWO CONDENSER MICROPHONES AND CAMERA DOCUMENTATION

DETAIL OF PANEL UNDER SIDE: ARDUINO COMPUTER, BREADBOARD, 6 VIBRATION MOTORS



SYSTEM FLOW SKETCH



SHADOWS CAST ON CEILING

DETAIL OF ANT ACTVITY NEAR CONDENSER MICROPHONE

DETAIL OF ANTS ON GLASS SUBSTRATE

When Species Meet, written by Donna Haraway, opens conversation about interspecies relations, specifically those between humans and domestic nonhumans. She reflects on how these relationships change both species, and how that change results in something other. These human/pet interactions lead into a larger conversation, questioning our human-centric worldview.

In *How Forests Think: Toward an Anthropology Beyond the Human*, Eduardo Kohn studies the Runa people in Ecuador's Amazon. Kohn focuses on how these people exist with and relate to the species around them. For the Runa, being "human" is a set of specific qualities and characteristics, it is not intrinsically *Homo sapien*. Dogs and other animals can become human, just as humans can slip into other species. Particular environmental circumstances have different, ideal forms of being, meaning it is not always ideal to be human. For example when hunting, it is better to be prey-like to avoid being noticed and to have a sense of where to hunt. To turn into an animal, a human can ingest a living, raw material from the animal of choice– such as bile or blood. Humans can also slip into animal-being when leaving the physical world. The human is a complex state of being, not a fixed physical form.

The idea that the human is intertwined with and subjected to the complexities of the environment network (rather than existing on the periphery of it) is integral. The Pogonomyrmex works investigate, through process-philosophies and materiality, how seemingly distant species can affect one another. A non-anthropocentric viewpoint is used observe both species. I compare the antness of the Harvester Ants and the humanness of humans, looking for overlaps in behavior, experimenting with ways of shifting from one to the other.

Ken Rinaldo creates shared environments with living organisms, merging the organic with technology to mechanically eliminate human/nonhuman distinction. In *Augmented Fish Reality*, Siamese Fighting fish are placed in bowls which sit on a robotic body with wheels. Motion sensors detect where the fish swim and which direction they are facing, moving the robot in that direction—therefore the fish control their own

AUGMENTED FISH REALITY, 2004.
FISH-CONTROLLED ROBOTS AND PROJECTION

SYMBIOTIC FISH/LILY ECOSYSTEM DETAIL

movement through the space. Siamese Fighting fish have eyesight strong enough to allow them to see beyond their bowls, so their movements are based on their visual surroundings. An aggressive and territorial species, male fish move toward other males to attack. Rinaldo also noticed a tendency of the fish to move toward humans—presumably due to an association with feeding. The robots allow the fish to navigate throughout the room, similar to how humans do. Video cameras inside of the bowls are linked to projections, which offer a fish viewpoint for humans to experience. The fish are enabled to act more human-like through mobility, and the humans become more fish-like through sight.

Natalie Jeremijenko invents and adapts methods for how to coexist with other species and ecosystems in a more sustainable, realistic way. She focuses her research on the needs of both humans and nonhumans in a given environment, and produces work that offers insight or solutions. While her designs are realized, they exist as art-meets-prototype. They are both functioning objects/systems and theoretical questioning devices. *Fish 'n MicroChips*, a project conceived by the Cross[X]Species Adventure Club, consists of plastic buoys floating vertically in the East River. The underwater portion is fitted with motion detectors, picking up movements of nearby fish. This motion activates LEDs in the top portion of the buoys, transferring underwater activity to above-water signals. Land dwellers, such

FISH 'N MICROCHIPS, 2011
LED/MOTION SENSOR BUOYS FLOATING IN RIVER

as humans, can gain a better sense of what is happening under the surface. This brings these two seemingly divided systems together. To learn more about the condtitions, the viewer can then text a provided number, which will respond with additional water ecosystem information: dissolved oxygen levels, frequency of fish activity, etc.


LED/MOTION SENSOR BUOYS, DETAIL

Jeremijenko offers a fish food source at the site (which is also edible for humans) that contains chelating ingredients. These elements leach heavy metals and polychlorinated biphenyls out of the fish and out of the water ecosystem. The food directly connects humans and nonhumans via a shared eating experience, linking our actions to affect and vice versa. Her work is rooted in complex (eco)system studies. It is based on the non-anthropocentric, the push and pull of how all system parts function together and change one another. To promote an overall environmental health, Jeremijenko must understand how all of these system parts affect and are affected– human and nonhuman actors, and all non-living actors (food, water, chemicals, cell phones, etc.). While the result is directed to the human (as audience), the process highlights the human's direct and entangled relationship with the system.

By bringing nonhumans (ants, bacteria, roaches, etc.) into artwork in an active way, the role of the artist shifts from being an independent maker, to being a co-creator—an actor amongst many, intertwined with and changed by the energies of materiality. Kohn and Haraway look past the anthropocentric to gain a better understanding of how actors interact. Artist, viewers, nonhumans and all nonliving materials become rich with potential to shape events. The parts define the system. The work is the system that is simultaneously doing the work, leading to future works. It is an ongoing web of networks, framed by experimentation, that are subjected to fluctuation as interiors and exteriors seep in and out. Latour breaks down the system while Deleuze and Grosz discuss how to view it, dividing it up so that when something emerges, it can be seen. Webster, Starling, Jeremijenko and Rinaldo utilize and capture these flows. Awareness of these systems: how they work and where they end, leads to finding emergence, which leads to making work(ing)s.

1 Bruno Latour, *We Have Never Been Modern* (Cambridge: Harvard University Press, 1993), p. 37.

2 *Actor-Network-Theory*, Encyclopedia of Science and Philosophy. 30 Apr. 2014 <http://www.iscid.org/encyclopedia/Actor-Network_Theory>.

3 Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Durham and London: Duke University Press, 2010), p. 112.

4 Lars Spuybroek, *NOX: Machining Architecture* (Thames & Hudson, 2004), p. 352.

5 Elizabeth Grosz, *Chaos, Territory, Art* (New York: Columbia University Press, 2008), p. 22.

A CONVERSATION WITH NATALIE JEREMIJENKO:

Dana Hemes: Your work questions how we can co-exist with, or integrate into the environment better, as opposed to reverting back to the idea of pre-human "natural." In that sense your work is present/forward thinking: it looks at the needs and expectations of people today and focuses on solutions that make contemporary life more sustainable. Could you speak about the kind of future you're imagining?

Natalie Jeremijenko: I don't go for the kind of producing visions bullshit. I have spent a lot of time framing the work as something that is a proxy for the common good. This is in the tradition of institutional critique where the Environmental Health Clinic [program that Jeremijenko directs, through which many of her projects come about] makes this exclusive claim as the best proxy of the common good. There are many variations on how to achieve this goal, left/right wing, pro/no development, etc., but no one is anti-health. This commonality is a meaningful place to talk about how production and infrastructure decisions affect our future.

Everything I do is in order to improve human environmental health, not in the tradition of producing artistic visions of the future.

You've spoken about the act of eating as a shared experience to demonstrate that we are in the same system—interspecies energy bars, etc. What are some of the other ways in which you've constructed shared experiences?

These experiences fall under the technical category of socio-ecological sytems design [an interface between natural, ecological and social sytems].

A few years ago I ran the Cross[X]Species Adventure Club, where we explored food systems that could improve environmental health: increase biodiversity, air quality and water quality. Rather than following the food movement motivated by reducing food miles and reducing petrochemicals and pesticides (reducing their negative effects—which of course is good and lovely and radically necessary but radically insufficient), I'm committed to exploring food and food systems that increase biodiversity– there's a whole range of versions that add up to these good goods.

BIOCHAR CHAR, 2011. BIOCHAR AUGMENTED "X"

INCREASED GROWTH

Biochar Char, *another example, was a project held at the Socrates Sculpture Park. I asked people to bring their junk mail and other material and then we incinerated it in a pyrolysis oven to create biochar (which is the byproduct of a waste to energy process [and can be used to increase soil fertility]), then we had a salsa DJ and a barbeque at the event. Part of the park was then augmented with the biochar [making a large "X" on the lawn]. It became a public experiment in Long Island City. People could see the increased growth in the augmented area: 40% increase in growth, and 15 extra species grew that were not found in the rest of the lawn.*

With socio-ecological systems design in mind, could you speak about how you manage to eloquently discuss very serious environmental issues? I'm particularly interested in the role of humor and play to engage viewers.

I think anything goes in terms of participation, the spectacle, and playful engagement if it measurably improves environmental health.

The Environmental Health Clinic is a framework for qualifying or giving credential to people to do things, and to make the good desirable. There is no funding, I can't pay them—it is only motivated and built and implemented and done out of the desire that people have to see, or explore. It's actually driven by desire and curiosity, not incentive schemes or finances.

Your work is activated within the environment that it is speaking to and about, which often requires that the work exists out in the world. However, you also manage to directly engage with the art world, working within galleries and museums as well. Does the location/ opportunity decide the type of project or does the project demand a specific location?

MothCinema, *for example, is a screen that hangs in a park over plants that provide provisions for moths. It is illuminated at night by a beam of light that attracts the moths and then casts their shadows as they play out their nightly dramas.*

MothCinema *is a piece that has been 'collected' by a recent intern of mine, Olivia—a 17 year-old girl from Columbus Ohio. She is bringing the* MothCinema *back there. To me it's interesting that she's the collector of sorts. She wants to make one, so she puts the energy and time into doing*

that— We've gone through and studied all of the moths she might attract, what might be a good site for it, where it's in close proximity to other moth resources, and where we can spectacular-ize the presence of these pollinators and what role they play in our ecosystem. She has a lot of friends in bands so they come and accompany the MothCinema *with music—Her classmates participate in story telling: explaining how the moth plays in the local environment, drawing out love triangles, how to find various plants that moths like...*

MOTHCINEMA, 2011

Olivia came in not knowing about moths in her area. It's not becasue of her expertise, or that she considers herself an art collector in any way—instead as a sort of radical pedagogy, we are all educating each other about these valuable urban co-habitants that really contribute to our health and are critical to our ecosystems and food systems. You know, we are in the middle of a pollination crisis that we know very little about. This makes me think about the spectator relationship we have to these socio-ecological systems we depend on.

So it's less about this abstract fight, which is site-specificity, but instead about very particular people and their very real social relationships and their desire to make a site lovely or wonderful, or to explore and display their local biodiversity. All of the projects need their own logic to make sense in their local environment, but the rationale is clear that this is in order to improve the overall environmental health.

An emergent, feedback-powered interspecies construction: Harvester Ants were placed in a single container made in the fashion of a traditional ant farm—sand between two panes of glass. As the ants displaced and tunneled through the sand, patterns revealed themselves.

I set a simple rule for co-laboring to create the constructions: ant observation→translation from ant scale to human scale, from ant materials to human materials→construction via mimicry of their patterns, movements and pace. As ant tunnels met the walls of the containers, I drilled in to that point and attached vinyl tubing, replacing their boundary with a new pathway. The vinyl tubing connected and bifurcated based on the ant tunneling patterns. As the interspecies creation continued, stages of progression became clear:

Stage 1: Vinyl tubes filled the airspace, crossing through the room, connecting all walls. As the density of the ant tubes increased (as the ant tunnels increased), human accessibility decreased.

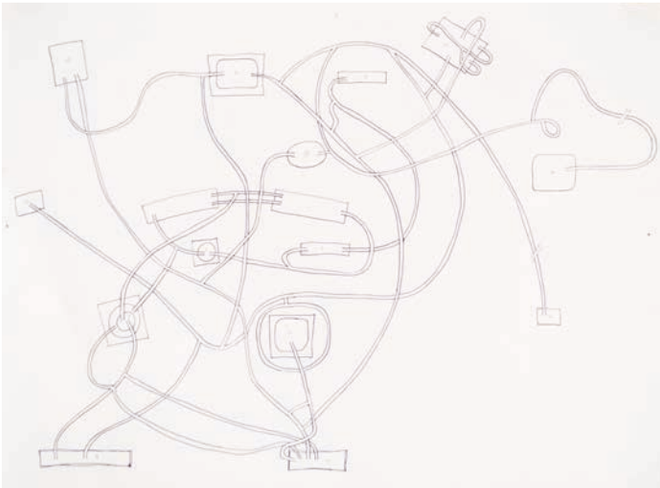
POGONOMYRMEX/HOMO 1-4, PHASES 2-3, 2013. OVERVIEW OF STAGE 2

Stage 2: A building inspection caused the fire marshal to check the boiler room, entering the feedback loop. The inspector insisted that I remove the project to restore access to the valves on the back wall. In response to this new rule, I built a bridge around the preexisting ant tubes to allow humans to more easily access the space. The bridge had railings, providing an interior pathway for the viewer to access the far wall—similar to how ants moved through the interior of their tubes.

Stage 3: Upon a follow-up inspection, the fire marhsal deemed the bridge unsatisfactory: the path was too narrow and stairs were not allowed. In response, I removed the bridge and built a low platform, setting the tubes into grooves cut into the platform slats.

Stage 4: Following the mimicry rule: as the ants broke through their boundaries, I broke through the human boundary—the walls of the room. The ant tubing was brought up through the ceiling space and dropped down into adjacent rooms.

Stage 5: As the final batches of ants died off, the tunneling patterns in the containers were recorded via a plaster-casting process, inverting the pathways. The plaster objects are then repurposed as guides for future systems.



ANT-SYSTEM MAP

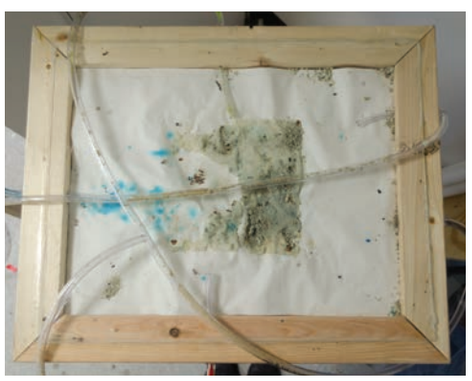
DETAIL OF ANT ACTIVITY IN VINYL TUBING

DETAIL STAGE 1: VINYL TUBES CROSSED THROGH THE ROOM CONNECTING VARIOUS ANT CONTAINERS, PREVENTING HUMAN ACCESSIBILITY

DETAIL OF TUNNELING PATTERNS IN VINYL BAG

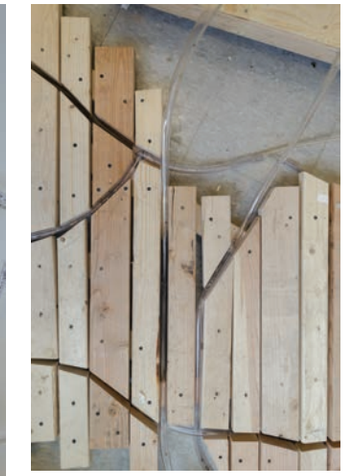
STAGE 2: A BRIDGE, BUILT AROUND THE PRE-EXISTING ANT PATHWAYS, PROVIDES ACCESS FOR HUMANS TO ENTER A LIMITED PORTION OF THE SPACE

DETAIL OF ANT ACTIVITY AND SPROUTING SEEDS

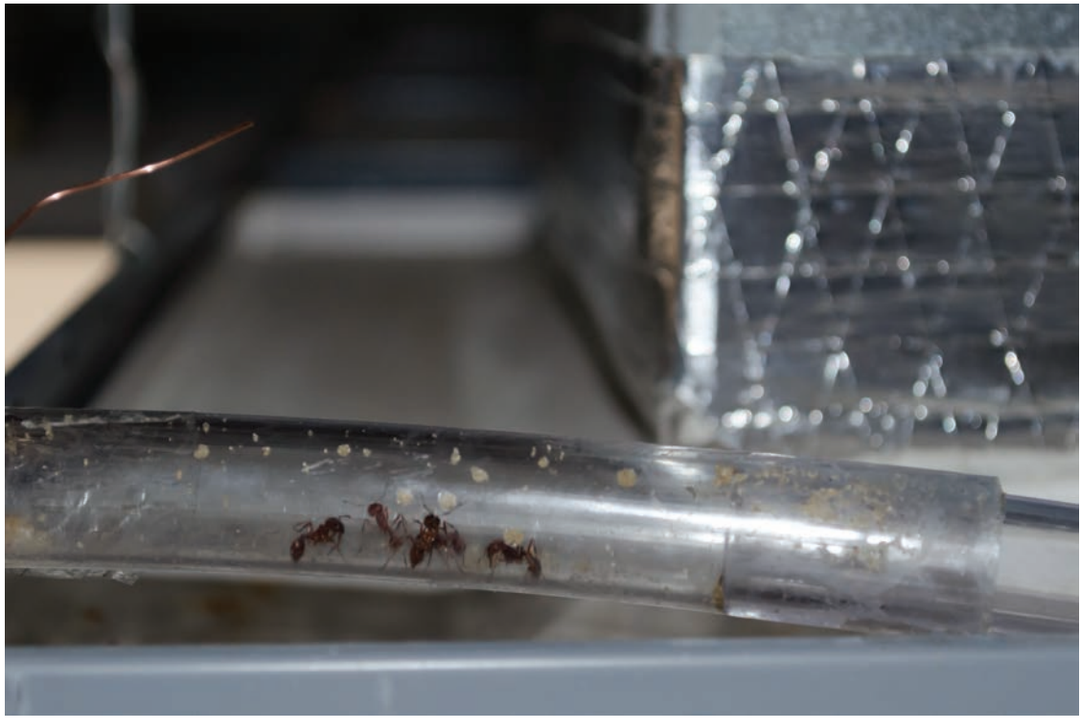


ANTS CARRYING PIGMENT ONTO DAMP RICE PAPER (TRACING THEIR MOVEMENT AND PROVIDING A FOOD SOURCE)

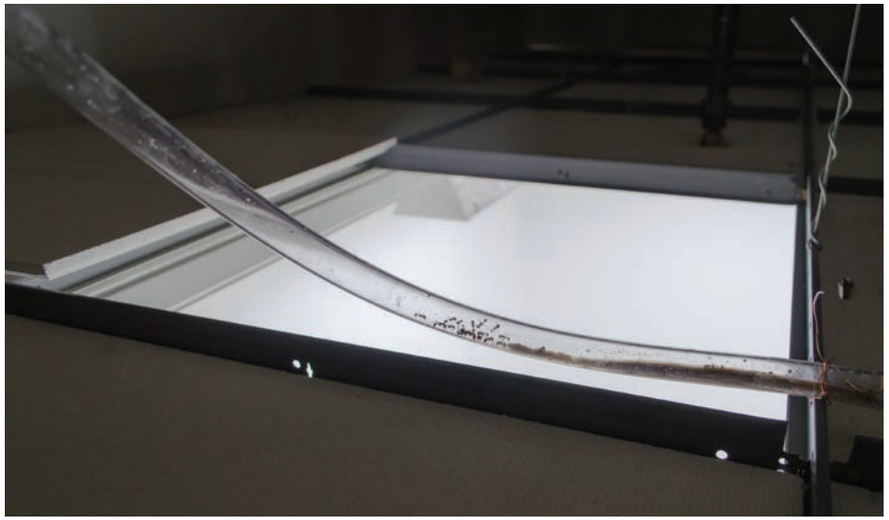
STAGE 3: A PLATFORM REPLACED THE BRIDGE TO COMPLY WITH BUILDING FIRE MARSHAL– AN ADDITION TO THE FEEDBACK-BASED SYSTEM

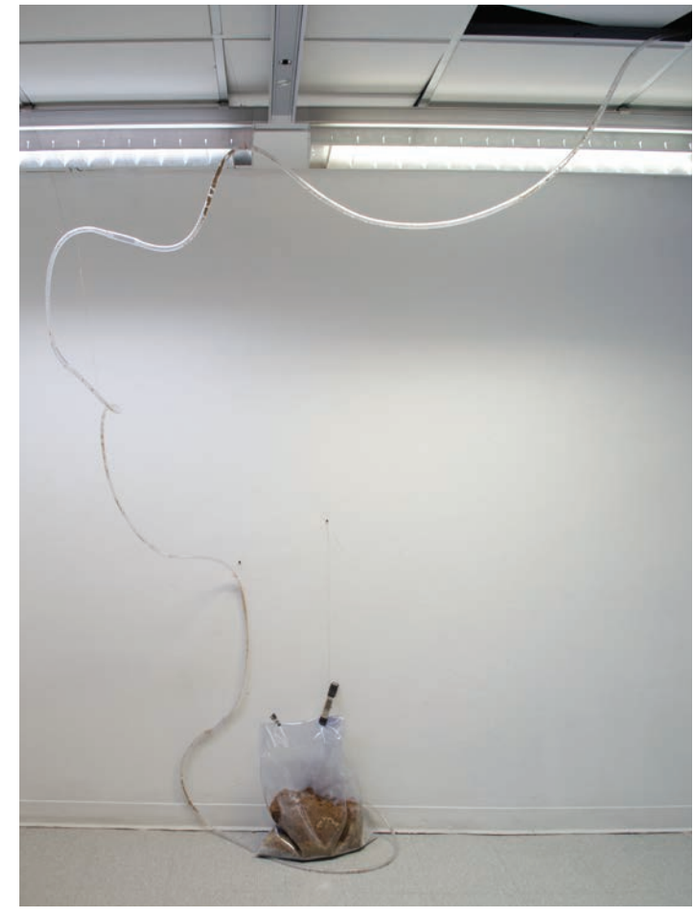


DETAIL OF PLATFORM GROOVES TO FIT ANT PATHWAYS



STAGE 4: ANT TUBING BREAKS THROUGH THE BOUNDARIES OF THE ROOM, EXTENDING UP INTO THE CEILING SPACE





ANT PATHWAYS DROPPING DOWN INTO ADJACENT ROOMS

STAGE 5: PLASTER CASTING AS INVERSION RECORDING PROCESS

PATTERNS AND FORMS COLLECTED FOR REPURPOSING INTO FUTURE SYSTEMS

Phase 1: A space dividing system separated humans and nonhumans in a gallery setting. Hollow sphenoid hendecahedrons made of sugar glass contained living roaches. Sphenoid hendecahedrons were chosen for their ability to stack, infinitely with no gaps. As a total space-filler, the forms act as an impenetrable object for humans. However, the scale allows the same forms to act as spaces for roaches. As the roaches chewed through the walls of their containers (both temporary boundaries and food source), they entered the adjacent geometric spaces. Once the roaches chewed through the outermost boundary, the form no longer separates.

BLAPTICA/HOMO 1, PHASE 1, 2012. SUGAR-GLASS SPHENOID HENDECAHEDRON CONTAINING A LIVE, BLAPTICA ROACH

Phase 2: The roach sugar consumption proved to be too slow for the thickness of the sugar walls. To aid in the form shifting, the stacked cells were relocated to an outdoor (eco) system. The dry, cool gallery was replaced with a damp forested area, rich with bacteria and other living organisms. As the roaches worked from the inside-out, the new system components worked from the outside-in. In only a few days, the forms shifted, no longer distinguishing an interior from an exterior.

ROACH/SUGAR CELL SYSTEM SKETCH

LEFT: *BLAPTICA/HOMO 1, PHASE 1,* OVERVIEW

HUMAN/NONHUMAN (ROACH) TEMPORARY BOUNDARY RESEARCH: SPATIAL INVERSION CASTINGS, COMPLEX GEOMETRIC FORMS WITH TESSELATING CAPABILITIES, AND OBSERVATIONS OF OTHER NETWORKING INSECTS

BLAPTICA/HOMO 1, PHASE 2: SUGAR FORMS WERE MOVED OUTDOORS WHERE OTHER ORGANISMS AND ENVIRONMENTAL FACTORS COULD AFFECT AND BE AFFECTED

THE SUGAR GLASS RESPONDED RAPIDLY TO THE NEW SYSTEM COMPONENTS: HUMIDITY, INSECTS, BACTERIA, ETC. IN ONLY A FEW DAYS, THE FORMS LOST THEIR SHAPE AND THE INTERIOR AND EXTERIOR DIVIDE DISSOLVED

Nutrient agar, a bacterial culturing medium, saturated twenty-four foot panels of fiberglass. I collected soil samples and swabbed them on the surface of the panels. The bacteria grew for one week, shifting from microscopic to dense bacterial and fungal growth covering the entire surface. The panels were then dehydrated and used as architectural elements, creating an eight-foot tall curved corridor.

BACTERIUM/HOMO 1, PHASE 1, 2013. OVERVIEW

Bacterium/Homo 1, Phase 1 is a scale-shifting, double-inversion device. It shifts the micro-scale to the visible-scale by providing nutrients and an ideal bacterial environment. By using samples from the soil, it inverts the ground into an architectural space. As humans move through the bacterial corridor, they too are theoretically inverted—many types of bacteria found in the soil also exist in human gut flora. The strong odor of the gases released by the bacteria fills the entire gallery, resulting in a shared (human and nonhuman) air experience.

BACTERIUM/HOMO 1, PHASE 1, 2013

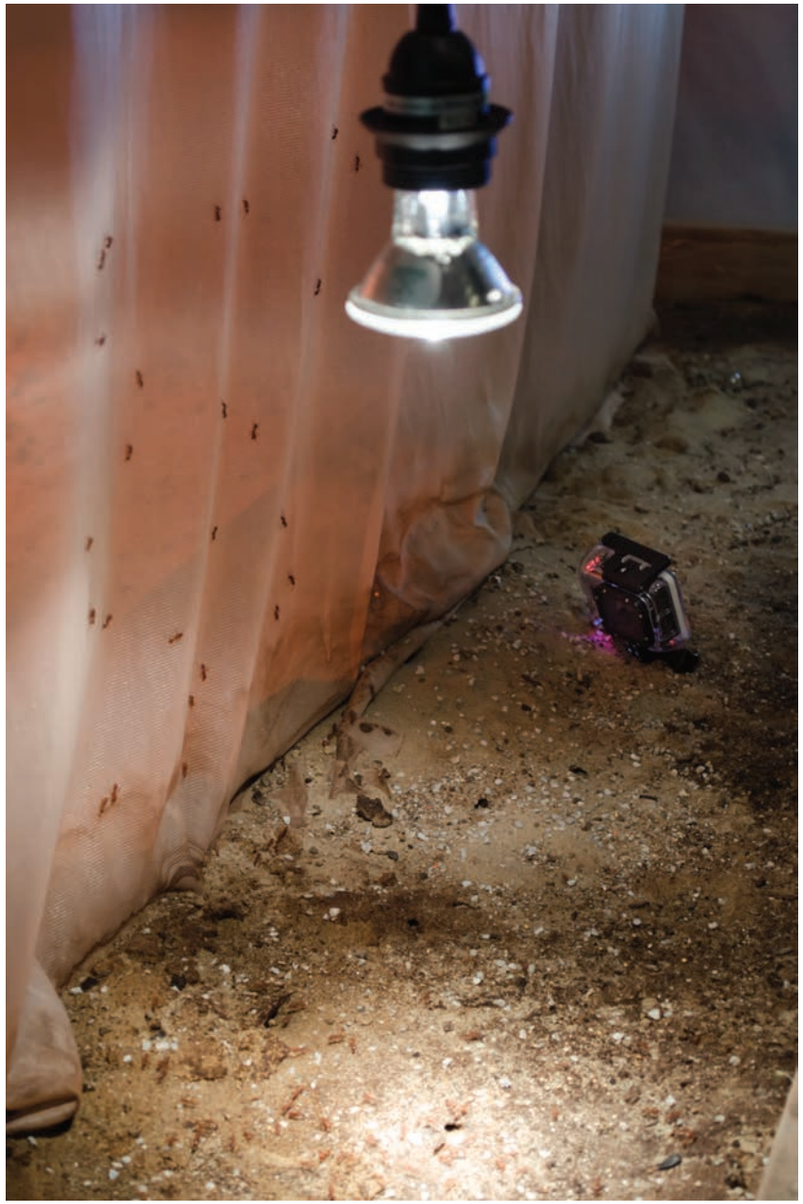
DETAIL OF BACTERIA GROWTH

SYSTEM SKETCH

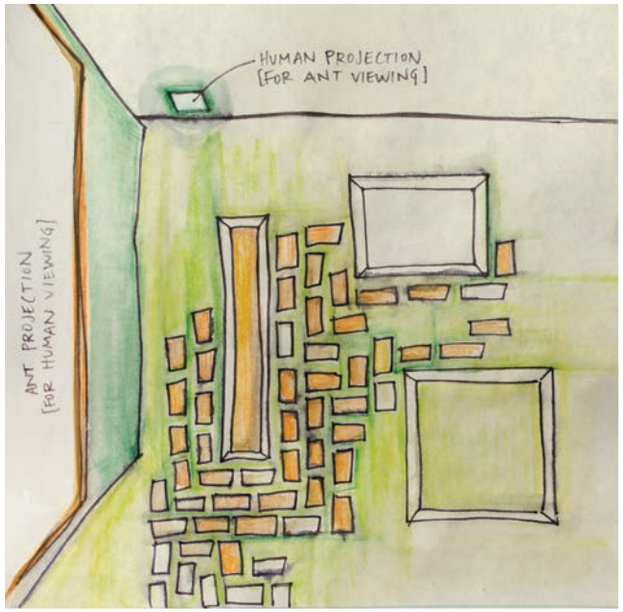
POGONOMYRMEX/HOMO 6, PHASE 4

Paving bricks create a human path through a sandy floor. Nonhumans (ants) live in the sand, extending throughout the room. Packing tape covers the sides of each paving brick, a surface too slippery for the ants to climb. Areas marked by frames of wood provide multiple types of human/nonhuman interaction zones: areas accessible to both ants and humans, areas accessible to humans but not ants, and areas accessible to ants but not humans. Two live-feed videos are projected onto adjacent, curtain walls. A large projection at human eye-level shows a landscape view of the ants. The scale-shift and the viewpoint bring the ant view to humans. Simultaneously, a very small projected video plays low to the ground. This video is a live-feed of human activity in the space from a birds-eye perspective—allowing ants to see humans in the way that humans normally view ants. Both species are observing and being observed.

POGONOMYRMEX/HOMO 6, PHASE 4, 2014. ANT VIEW



DETAIL OF CAMERA RECORDING ANT LANDSCAPE



VIEW WITH ANTS, PROJECTION FOR ANTS, AND HUMAN

VIDEO STILL OF ANT LANDSCAPE LIVE-FEED, PROJECTING AT HUMAN LEVEL

DETAIL OF HUMAN MOVEMENT LIVE-FEED VIDEO FOR ANTS

ANT MOVEMENT LIVE-FEED VIDEO FOR HUMANS

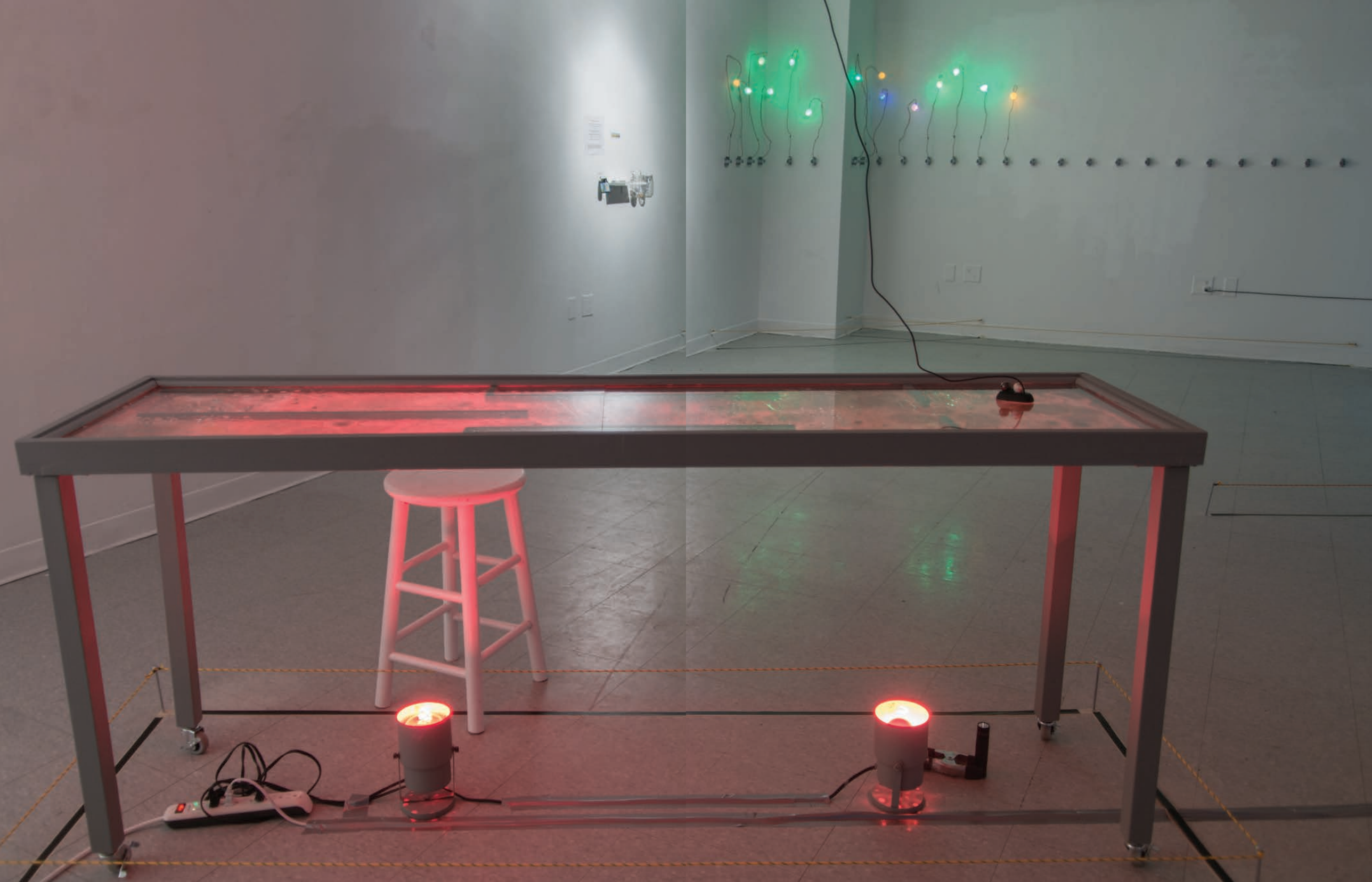
Homo[+]/Homo 1, Phase 1 is a gallery-based systems study, focusing on both the systems that humans function within and the systems that function within the human.

There are two main sections to the piece: a skin microbiome growth table with camera observation devices, and an internal microbiome reflector.

HOMO[+]/HOMO 1, PHASE 1, 2014. OVERVIEW

The internal microbiome reflector is participatory by choice. Sterile saliva test strips are provided to reveal the internal pH levels of participants (pH levels indicate what types of microbiomes our bodies can sustain). Each result is recorded on a slip of paper and deposited in a collection jar. At the end of each day, the data is collected and converted into a glowing orb lit by three LED lights. Each pH result has a different combination of LEDs. The orbs are then added to the wall and powered by battery—a chemical to electric energy shift, representational of how human body chemical levels affect neurons and brain activity. As new orbs are added to the dim corner, the ambient light shifts: the reflection of the internal conditions of the viewers who enter the space.

The skin microbiome incubation table is a glass, rectangular table (5′5″ length—my height) filled with nutrient agar and wooden separation bars that distinguish body from arms from legs, etc. Samples from my own body are swabbed in corresponding sections of the table. The bacterial and fungal growth is visible to the unaided eye but can be more closely studied with a microscopic camera device. Viewers can move the camera to any location of the table, and the image is projected onto a screen behind a wall. The wall blocks the projection from the person moving the camera—multiple viewers must function together to both move the camera and see the result. Since the bacterial growth and movement is recorded, the movements of humans in the space are also recorded. While participatory elements provide the viewer with the option to partake or not, the continuous recording of the space reminds the viewer that observation is never passive.



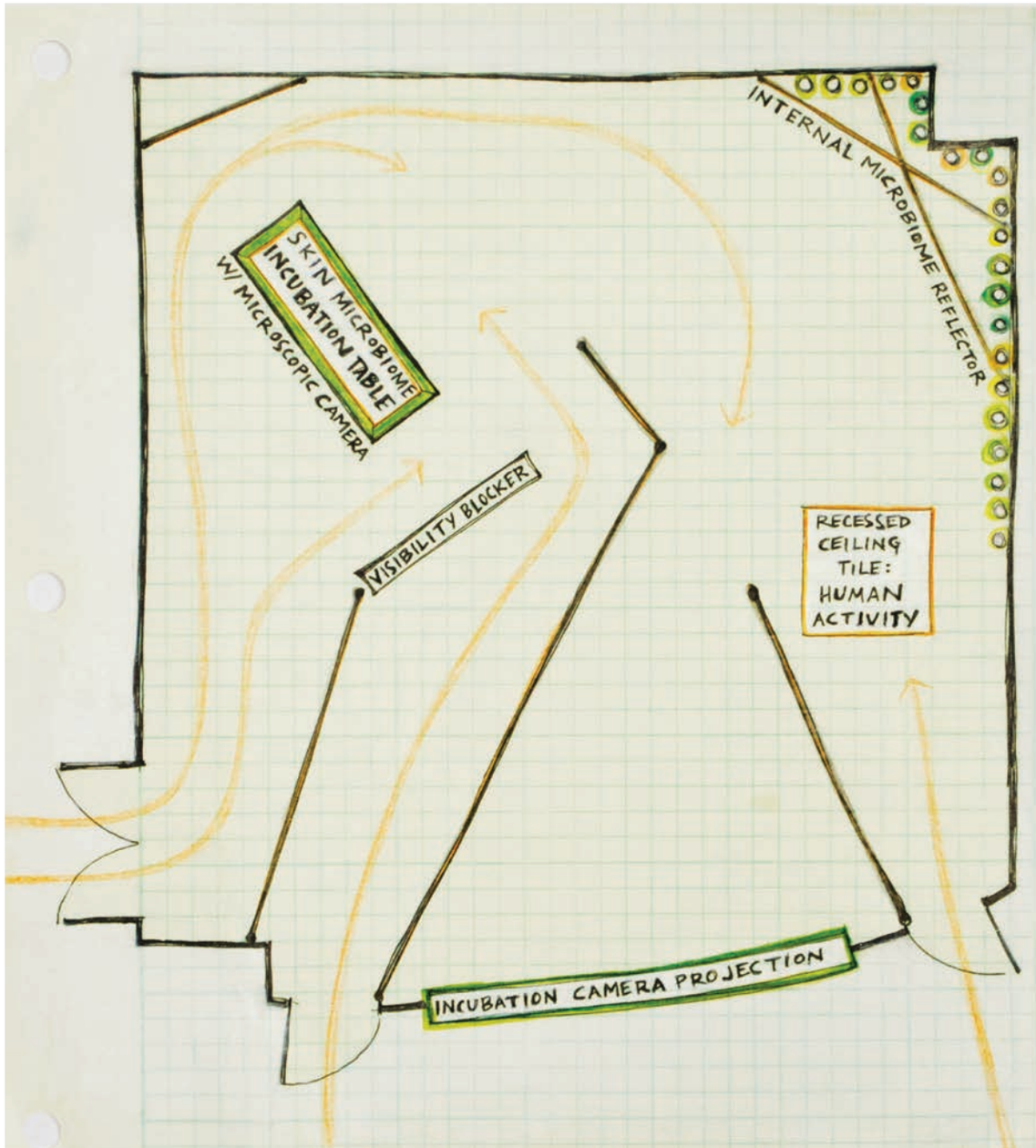
HOMO[+]/HOMO 1, PHASE 1, 2013. DATA COLLECTION AREA WITH INSTRUCTIONS:

INTERNAL MICROBIOME REFLECTOR:

1. TAKE ONE STERILE pH STRIP FROM THE BOTTLE BELOW
2. LICK BOTH SQUARES ON THE END OF THE STRIP
3. WAIT 15 SECONDS
4. DETERMINE YOUR pH LEVEL BY MATCHING YOUR STRIP TO THE COLOR CHART ON THE RIGHT
5. INDICATE YOUR pH LEVEL ON A SLIP OF PAPER BELOW BY MARKING AN "X" IN THE CORRESPONDING BOX
6. DEPOSIT THE USED pH TEST IN THE FIRST JAR
7. DEPOSIT THE SLIP OF PAPER IN THE SECOND JAR

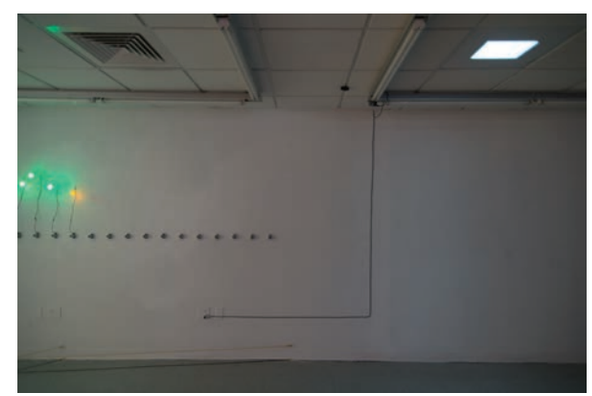
THE SLIPS WIL BE COLLECTED AT THE END OF EACH DAY. THE pH LEVELS, INDICATING WHAT TYPES OF INTERNAL MICROBIAL ENVIRONMENTS ARE PRESENT, ARE THEN CONVERTED INTO A COMBINATION OF 3 LED LIGHTS. EACH SAMPLE WILL BE ADDED TO THE WALL, CHANGING THE AMBIENT LIGHT OF THE ROOM.

DETAIL OF LED, INTERNAL MICROBIOME REFLECTOR ORBS

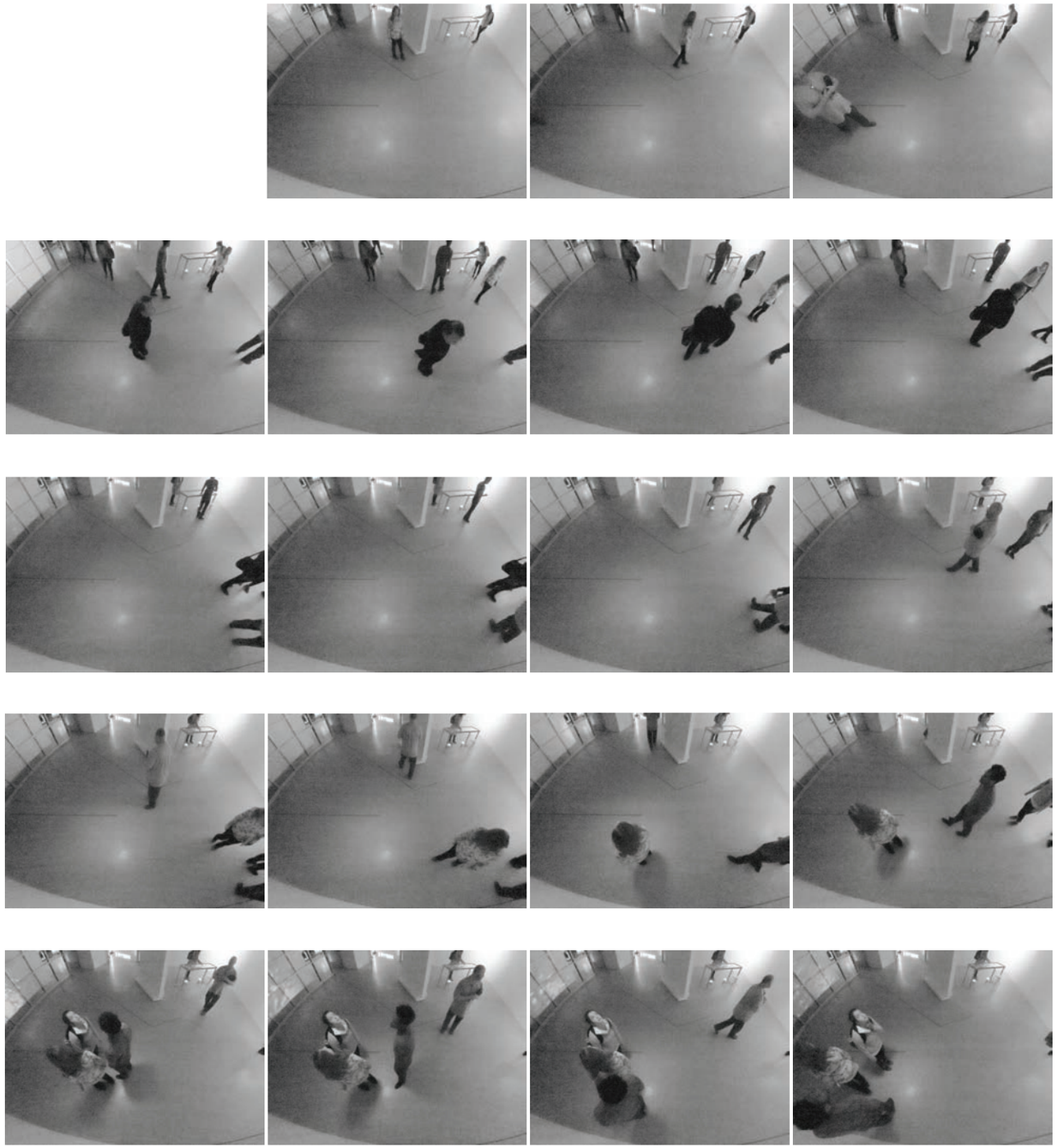


GALLERY FLOORPLAN SKETCH

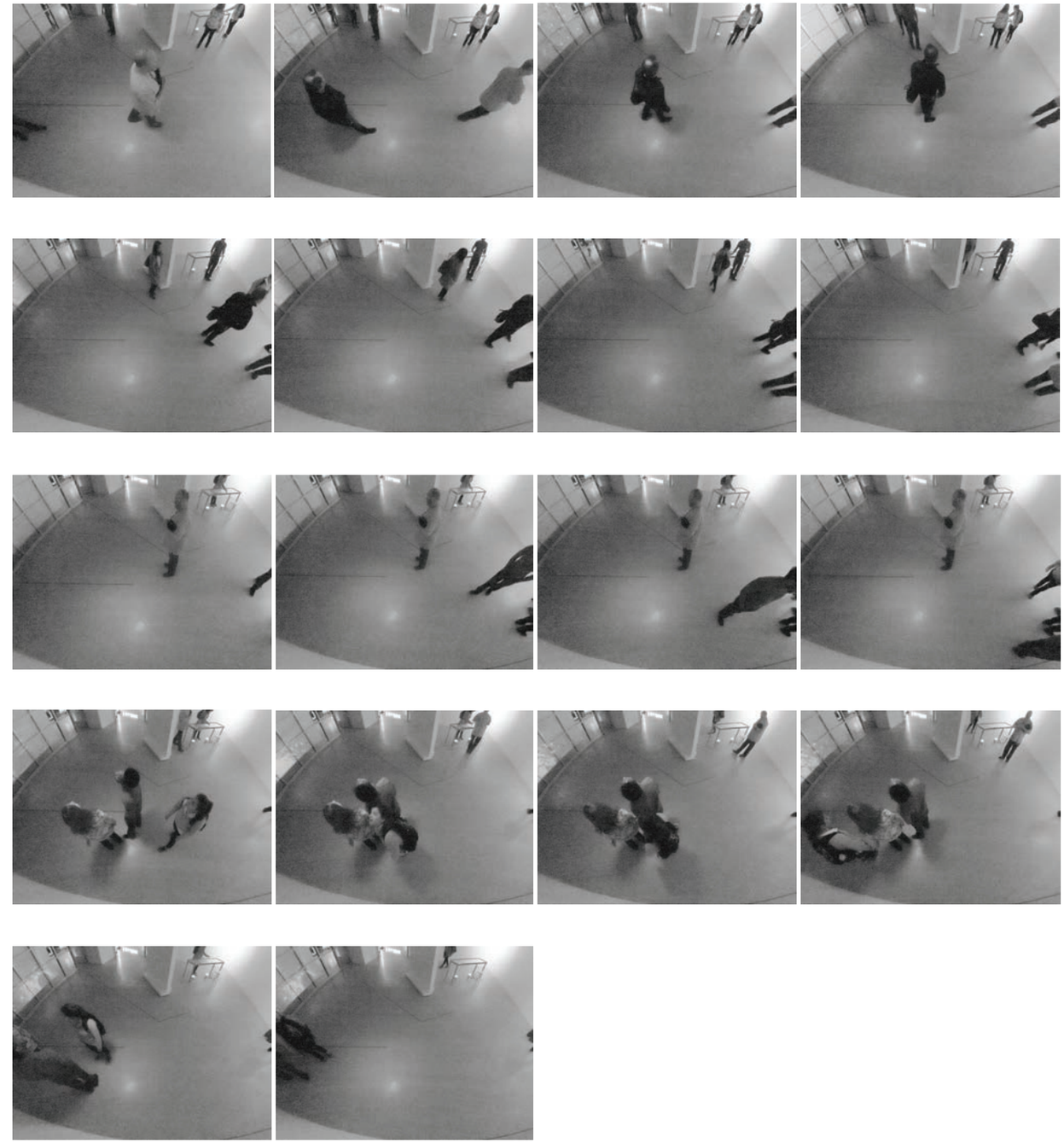
RECESSED CEILING TILE REVEALING A LIVE-FEED VIDEO PROJECTION OF HUMAN MOVEMENT THROUGH THE SPACE



INTERNAL MICROBIOME REFLECTOR ON THE LEFT; RECESSED CEILING TILE WITH VIDEO ON THE RIGHT



VIDEO OF HUMAN ACTIVITY AND MOVEMENT THROUGH THE SPACE



SKIN MICROBIOME INCUBATION TABLE [SELF PORTRAIT] WITH MOVEABLE MICROSCOPIC CAMERA

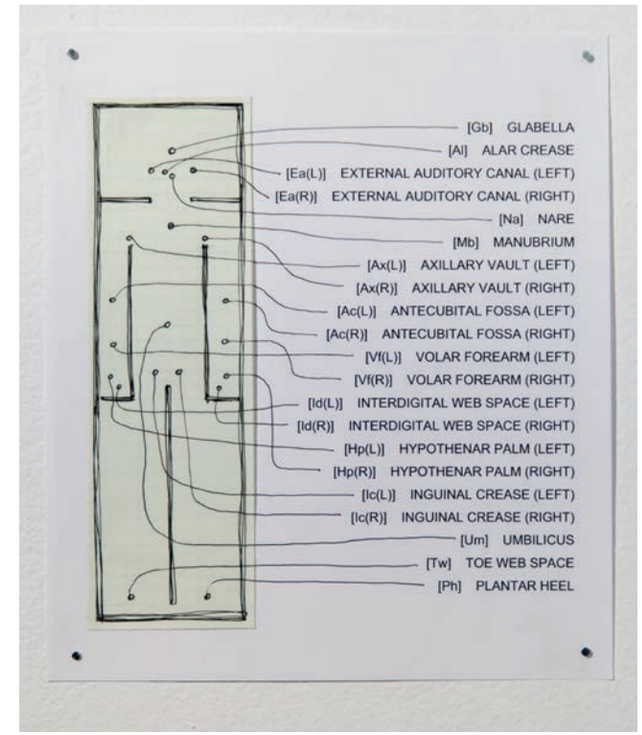
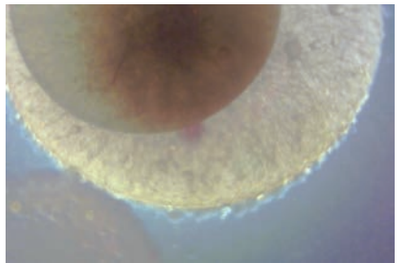
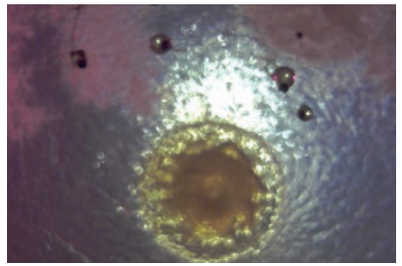
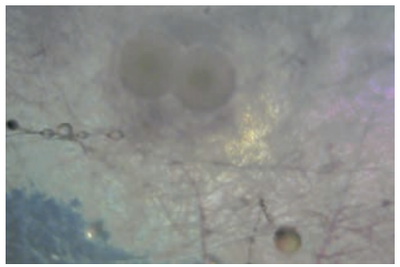
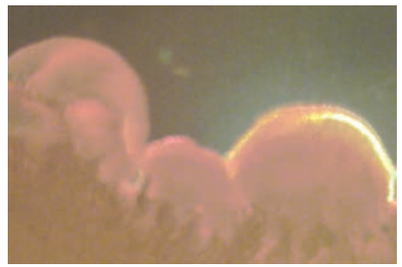
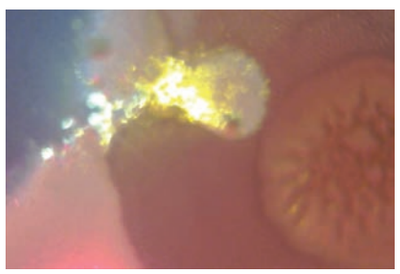
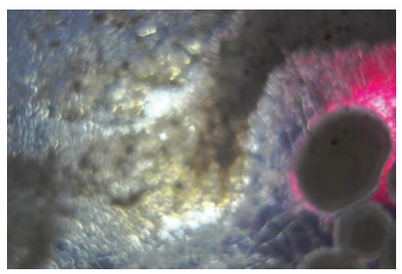
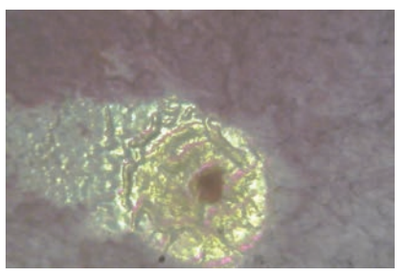
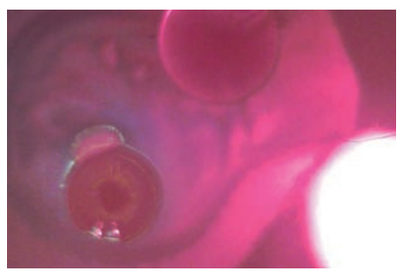


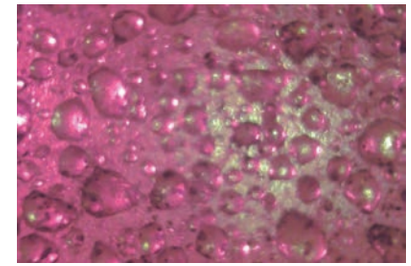
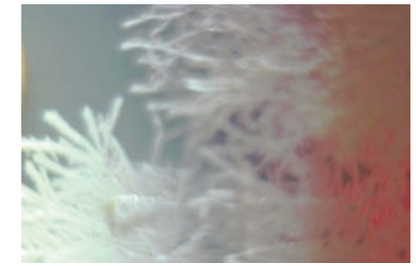
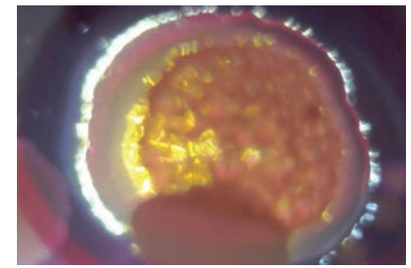
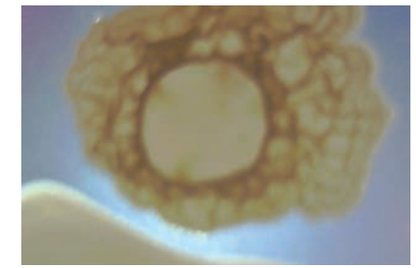
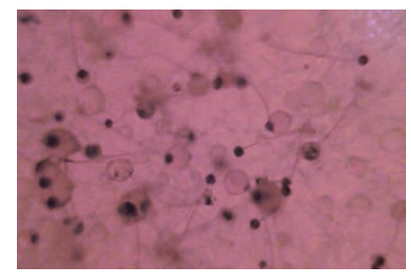
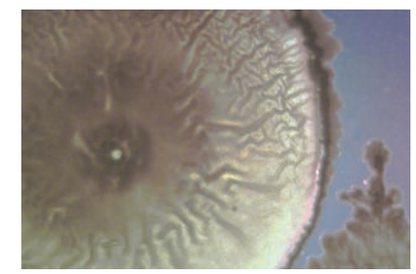
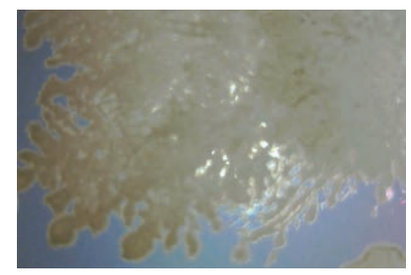
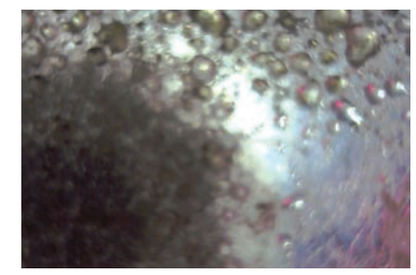
DIAGRAM OF CORRESPONDING SAMPLE LOCATIONS

EXTERNAL VIEW OF GLASS GALLERY WALL

LIVE-FEED VIDEO PROJECTION FROM MOVEABLE MICROSCOPIC CAMERA

ADDITIONAL MOVEABLE MICROSCOPIC CAMERA IMAGES

FURTHER BEYOND THE HUMAN

Emergent properties reveal themselves and the work continues...

How does the non-anthropocentric move into the non-anthropogenic? What happens to an art practice when the human is completely removed? What new technologies are needed to better convert humans and nonhumans for more complex shared experiences? In what other ways can organisms enter into dialogue with humans? or with other nonhumans? What can emerge from interactions with other types of nonhumans? Simpler ones? More complex ones? How can these systems reach farther? How do virtual systems shape humans and how do humans shape them? What results from a non-anthropocentric observation of the human? Do humans need to be reduced to algorithms and behavioral patterns to be viewed from outside of the human? What larger systems do humans and nonhumans engage in already? How do our internal systems affect our brain activity? What happens to the "self" if it is dependant on other living microorganisms? What is a human without the "self"? Can these shared experiences extend beyond the boundary of the work? longer than the duration of the piece? How can these framing devices become mobile? How can these mobile-system-frames connect to one another? How is the data received more efficiently collected and repurposed? How does matter, and its vibrant energy, more effectively enter the system dialogue? How can variou paces come together, like shifts in scale? How do boundaries...

BIOGRAPHY

Dana Hemes constructs system-based, visual experiments with human and nonhuman participants to explore interspecies dialogues, examining how these interactions can change the meaning of communication. Born in 1986, she grew up in Lafayette, LA. She holds an MFA in Studio Arts from Montclair State University, and a BFA from NYU in Photography and Imaging. She has been artist-in-residence at Whitecliffe College in Auckland, New Zealand and with the School of Making Thinking, in New York and exhibited at Whitecliffe College, Cardiff School of Art and Design, and at MagnanMetz Gallery in New York. She has lectured at SVA and at MSU, and lives and works in New York.

A very special thank you to the many people devoting time and energy to the growth of my practice–

My mentors, through exterminators and petitions:
Dr. Andrew Atkinson
Iain Kerr

Our critics, offering encouragement and guidance:
Eleanor Heartney
Matthew Nichols

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