

P 24

Atmospheres and Ecologies

- Alex Haw (gb):
Auto Atmospheres & Artificial Ecologies. Natural
Architecture and Artificial Environment
 - Anna Dumitriu, Blay Whitby (gb):
Cybernetic Bacteria 2.0. The Interface of Biodigital Communication
 - Andrea Polli (us):
Airspace
- Susan Ballard (nz):
Nonorganic Life: Encounters Between Frequency
and Virtuality in Antarctica

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Auto Atmospheres & Artificial Ecologies

Natural Architecture and Artificial Environments

We humans are all weather men, constantly cultivating and modifying the climates that surround us at every conceivable scale, from the miniature local excretions of our subcutaneous cells to our operatic military manoeuvres in weather modification. Each adjustment acts as a form of architecture – a sheltering moment in our unending project of climate control, submitting the chaos of the external climate to the controlling and organising tendencies of humanity.



Fig. 1: The Boughs of London Photo: Alex Haw – atmos

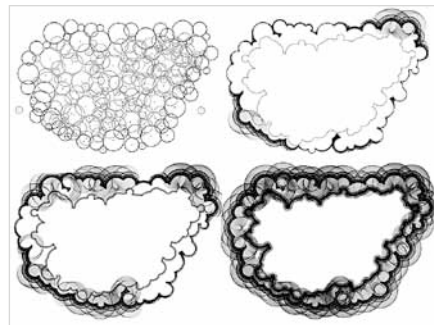


Fig. 2: The CLOUD Photo: Alex Haw – atmos

Architecture's role in the construction of our inhabitable environment has always been multifarious and ambiguous – functional yet ornamental, liberating yet repressive, physical yet also mental. With the rise and proliferation of digital media technologies, the climate it confronts has expanded far beyond the traditions of rain and heat to a much murkier artificial cloud of our own construction, an ever-evolving physio-cultural soup of data and information utterly eroding the distinctions between the virtual and the real.

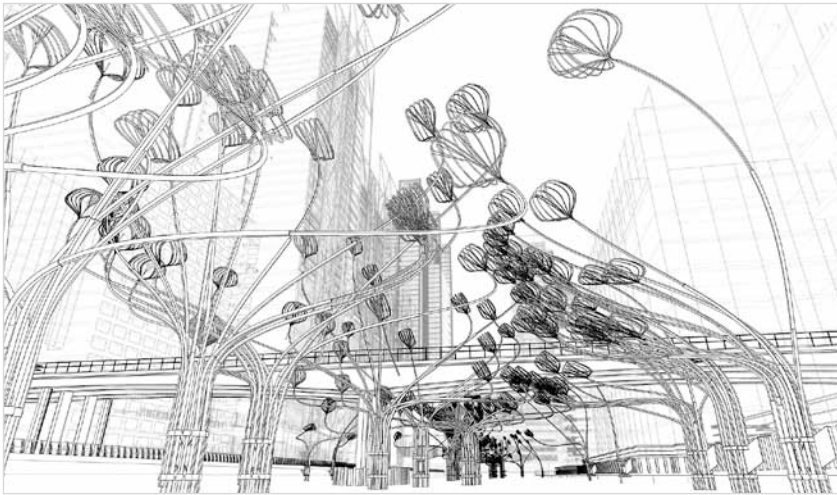


Fig. 3: Sunlands Photo: Alex Haw – atmos

This paper surveys an extremely brief history of architecture's relationship to both weather and media, probing both the climate as culture, and techno-artistic experiments as new weather systems. It surveys the twin scales of our climatic ambitions, from our participation within small-scale ecologies of the internet to our global projects for weather modification across the entire earth. The paper ends with the case study of our own studio's investigations into architecture's relationship to weather, new and old, and our ongoing investigation of the manufacture of artificial climates.

Our collaborative project for the CLOUD for London 2012 explicitly proposes an immersion into the twin climatic streams of the physical and the digital, immersing its visitors in gusts of data whilst they hover above the actual clouds of London, offering an environment composed as much by the particulate matter of man-made acts as sunshine and raindrops. Weather Projection broadcast live solar and satellite data from around the world into an observation space overlooking Sydney Harbour, transmuted the instantaneous data-space of the internet back into a tactile, luminous, immersive, social environment. Sunlands delivered qualitative environmental data back to the barren quantitative landscapes of Canary Wharf, updating unflinching automated universal time with the rich and ever-changing experience of global solar time.

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Cybernetic Bacteria 2.0

The Interface of
Biodigital Communication

Introduction

Cybernetic Bacteria 2.0 is an interactive installation which makes explicit the sublime correlations between human digital communication and bacterial chemical communication. The project was a collaboration between a visual artist (Anna Dumitriu), a microbiologist (Dr Simon Park), a philosopher (Dr Blay Whitby), an interactive media artist (Tom Keene) and an artificial life programmer (Lorenzo Grespan) and was commissioned by The Science Gallery in Dublin as part of their exhibition "Infectious"

The scientist, unconcerned with the ethical implications of his experiment and also unaware of the artists intentions, didn't anticipate that the fusion of the Earth's global bacterial communications network, with that of human origin would lead to the evolution of a novel and chimeric life form. Tainted carbon fused with doped silicon. Dublin became the epicentre of a new epidemic, and the origin of a new kind of contagion able to subvert both biology and technology. What followed was inevitable. What else would a creature with access to: humanities entire knowledge; the genetic toolbox that drives evolution; the sophistication of the pathogen; and intimate awareness of our vulnerabilities do. (Park, 2009)

Description of the Artwork

The artwork combines raw network traffic taking place live around the gallery (including web traffic, mobile technology and Bluetooth), a time-lapse film of bacterial communication occurring (involving two strains of genetically modified (GM) bacteria which will indicate, by changing colour or glowing, the communication taking place) and (generated from those sources) a new Cellular Automata artificial life form.

As a member of the audience approaches the installation a device "sniffs" the ubiquitous computing technology they are carrying, which is continu-

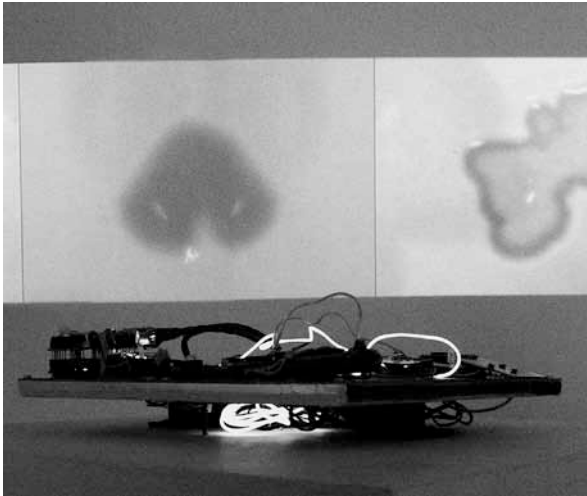


Fig. 1: Cybernetic Bacteria 2.0 installation view Photo: Anna Dumitriu

ally sending out signals such as the IP addresses of wireless devices, the names of Bluetooth devices and so on. In fact people are usually very shocked when the names of devices (often their own names in the case of mobile phones) are displayed in the installation (projected on to the wall). But the malevolent looking device, with its flashing electroluminescent wires and the hacked and soldered mobile phone which appears to have been assimilated into it, is not revealing anything secret, instead it is making explicit all the data we are (usually) unknowingly broadcasting to the those around us.

On a wall a video projection of bacterial communication taking place is displayed. The quorum sensing abilities of bacteria work in a similar way to nodes in the Internet, with a bacterium flagging up a message that says, in effect, "I'm here" to surrounding bacteria, like an organic form of "packet data". Due to regulations surrounding the use of genetically modified organisms it is not possible to easily show the live bacteria communicating in the gallery space as a "Category 2" laboratory would need to be specially built, however this is something that the project group are now looking into, as the experience of watching live bacteria "speaking" is very different to watching a film of it.

For Cybernetic Bacteria 2.0 a purple bacterium called *Chromobacterium violaceum* was used. This bacterium emits and detects a chemical signal. When a population hits a critical density, the concentration of the chemical signal reaches a threshold, which the bacterium is able to detect responding by turning on production of the purple pigment. The white coloured, genetically modified form *Chromobacterium violaceum* CV026 was also used to detect chemical signals and responded by producing a purple pigment also but it cannot produce the chemical signal itself. The other bacterium used was *Serratia marcescens*; it is also able to send out signals but cannot com-

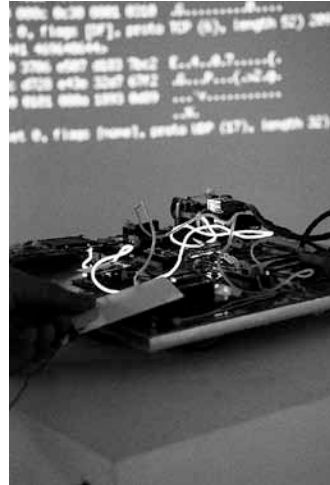
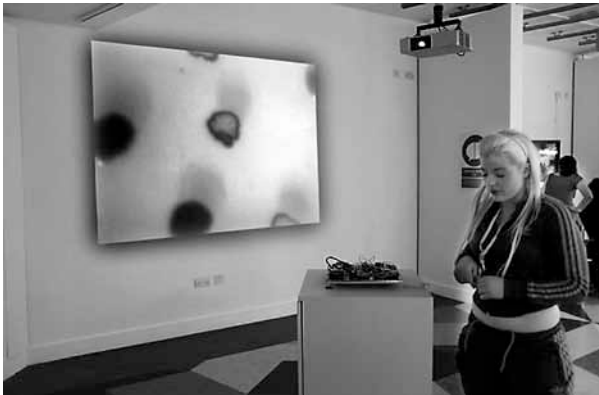


Fig. 2+3: **Cybernetic Bacteria 2.0 installation view** Photo: Anna Dumitriu

municate to the CV026. Colonies of this bacterium are a striking red colour due to the production of the pigment prodigiosin.

The data from the process of bacterial communication was modelled and combined with the “airborne” digital data being “sniffed” by the hacked device. Both elements were used to generate new rules for creating cellular automata. The presence of new pixels affects the global behaviour of the game: as in the original Game Of Life, and echoes the behaviour of the bacteria: each pixel stays on or is turned on if and only if two or three neighbouring pixels are also on. Furthermore, white pixels become, purple if they have a purple neighbour. Red pixels do not affect other pixels colour, but only their on/off state (Dumitriu and Whitby, 2009).

Conclusion and Future Developments

As the biological and the digital are becoming merged and new approaches in synthetic biology are blurring the boundaries between artificial and organic life this work seems timely. New advances in bacterial communication research offer infection control solutions that could replace current antibiotics as we become able to chemically strike bacteria “deaf” by blocking their communication receptors (Bassler, 2010). The artistic investigations will continue and it is hoped that ways to display live bacterial communication in gallery spaces will be found.

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Airspace

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This paper investigates how sound transmission can contribute to the public understanding of climate change within the context of the Poles. How have such transmission-based projects developed specifically in the Arctic and Antarctic, and how do these works create alternative pathways in order to help audiences better understand climate change? The author has created the media project Sonic Antarctica from a personal experience working in Antarctica. The work combines soundscape recordings and sonifications with radio-style audio interview excerpts. This work will be examined in the context of the other sound transmission science and art works.

The Poles are on the front lines of climate change. Known as the planet's refrigerators (DeRosa, 2008), they circulate cold air that drives many of the weather systems in the Northern and Southern hemispheres. The Arctic has experienced unequivocal warming leading to accelerated melting over the past ten years. However, by 2002, the Antarctic became a focus in the politicized mainstream media global warming debate because the research showed that overall the continent was cooling. (Doran, 2008) Lacking an understanding of the science and looking for proof against global warming for political purposes, some members of the mass media began to use the findings of Antarctic climate scientists to claim that global warming was false.

Through a series of interviews with climate scientists in Antarctica, the author discovered that the politicization of the global warming issue combined with the difficulty of communicating the complexity of climate science to the general public has contributed to a lack of public understanding of climate change. Several scientists interviewed by the author expressed the need for a greater understanding of climate change among the general public.

Since the first successful transatlantic radio communication by Guglielmo Marconi and his assistant George Kemp in 1901, radio has contributed greatly to the public imagination of the Poles. For example, within the subculture of the Ham or amateur radio enthusiast, the Poles are seen as the cause of both enhancement and disruption of long-range radio transmissions, and as a coveted goal by the long-distance Ham.

The Internet has also changed the paradigm of broadcast radio to a more distributed model, and media projects that use the Internet to stream sound



Fig. 1: Contacting the South Pole from McMurdo station via radio Photo: Andrea Polli, 2008



Fig. 2: Radio antennae at McMurdo Photo: Andrea Polli, 2008

live from the Arctic and Antarctic have been made in both an artistic and scientific context. Douglas Kahn has said that the annihilation of space and time is the goal of radio (Kahn, 2009), and while these projects transcend a seemingly insurmountable distance in near real time, in content they are firmly grounded in the present time and the political and geographic dimensions of the Earth. Structurally, metaphorically and aesthetically, the projects discussed in this paper re-frame transmission from a Polar perspective, giving a voice to both the people living in these remote locations and the rapid melting occurring there due to anthropogenic climate change.

In conclusion, because of the complexity of the information and the misinformation in mainstream media, there is a need for more direct public communication of weather and climate science. Sound offers a way for scientists to bring their messages directly to the public, by speaking to the public through recordings and radio transmissions and by collaborating on audification and sonification of scientific data. Listeners often respond to sound with emotion and empathy for the scientists' messages. Interdisciplinary collaboration is essential to the work of climate scientists in Antarctica, and radio allows for communication and possibly collaboration across vast distances, especially near the Poles. For these reasons, the Poles offer an opportunity for innovative uses of sound transmission and this sound can contribute to the public understanding of climate change within the context of the Poles.

Cooperation and partners

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Nonorganic Life: Encounters between Frequency and Virtuality in Antarctica

1. LIFE

The BwO howls: 'They've made me an organism! They've wrongfully folded me! They've stolen my body (Deleuze and Guattari 1996, 159).

This paper is not about Antarctica at all. In many imaginaries Antarctica exists as a virtualized yet real utopia. It is a place known through material productions that oscillate between the fictional and the scientific. The discovery of the Don Juan Pond lead scientists towards life formed by brine-derived nitrates (a kind of molecular self-organization by non-carbon sources) and onwards to the possibility of life on Mars. If it is autonomous, can reproduce and evolve, it must be life, mustn't it? Amidst complex computational models, nonorganic matter is not static; it changes and tying it to either nature or culture is impossible. Antarctica is such an object of study. To approach it we create an organism that can be sliced, imaged, recorded and folded. We steal its body so that it may open our eyes to other worlds. Likewise, in art's engagements with Antarctica, something else is formed. DJ Spooky captured the resonant frequencies of ice in *Terra Nova: Sinfonia Antarctica* (2008). In *The Journey that Wasn't* (2005) Pierre Huyghe lured a mythical creature to reveal itself to a sound beacon placed on an ice flow in apparently uncharted territory. Andrea Polli's *Sonic Antarctica* (2008) shows data to be always incomplete as field recordings and audifications are placed alongside interviews with climate scientists. The human inhabitants and their tools mark something specific about the media ecology that is Antarctica. These works suggest that our fascination with Antarctica derives from a need to distinguish differences between unstable materials, objects and behaviors – the spaces between contain evidence of life.

2. ECOLOGY

They discovered that there was another world on this planet, where the cloudy sky produced a milky green light that reflected off an icy ground, uniformly illuminating the air around them as if the landscape were glowing in the dark. It was a landscape without matter, only light (Huyghe 2005).

A second definition of nonorganic life extends to ecological systems subject to flows of energy that include nonorganic matter (DeLanda 1992, 133). Antarctica holds an ecological intensity that heralds a terrifying shift in the relations of nature to technology. Within its reality we map the very movement of the earth's climate. Phil Dadson records soundscapes, finding strange human inhabitants amplifying echo walls and polar winds playing pylons like a giant Aeolian harp. Dadson's Antarctica is not passive. Every element of *Polar Projects* (2003) is a functioning part of the Antarctic ecology, including pragmatic man-made additions. Ronnie van Hout recounts the emergence of an Antarctic horror in *the thing* (2009). There is nothing sublime about this figure dressed in all-weather gear and held within a secure containment room. Van Hout reminds us that Antarctica is an assemblage of nonorganic life mapped and traced by human use of media.

Guattari extended definitions of ecology to include human subjectivity and social concerns. DeLanda turns this toward a geological ethics (2002, 153). Morton argues that aesthetics play a crucial role in understanding the need for a dark ecology – an ecology without nature (2007, 2). In each of these definitions ecology is born from dissonance, including wider tensions of different material forces be these human, spatial or cultural. Antarctica is certainly formed from dissonance. Reframing Antarctica involves the recording of discrete states that adhere to the moment between science and fiction; and that engage complex mixtures of geological, biological, social and linguistic constructions.

3. MATTER

A given material may solidify in alternative ways (as ice or snowflake, as crystal or glass (DeLanda 2000, 16).

What is it that gave us the image of Antarctica as a pure white world, an inhuman and technologically free territory, inhabited by penguins? To address the problematic narrative of Antipodean magic and mystery we need to question the real fictions generated by technology. Joyce Campbell's *Last Light* (2006) employs anachronistic photographic techniques to chart looming contemporary phenomena that will have enormous and uncharted effects on our collective future. It is an engagement with the interchange of matter. The ice speaks. Antarctica remains geographically distant, silent, and yet visually close.

There is a metabolic process whereby Antarctica coordinates matter, energy and information. It formed from molecules that not only maintain the earth's balance, but filter and reflect back larger possibilities, longer histories. Reading the ice melt is a bit like consulting the oracle, the ice contains distributed knowledge of place, time, history and heat. As sound travels across and through the frozen environment frequency becomes a tool with which the great white expanse can be mapped. Dadson, Spooky and Polli make visible the magic of sonic forces to construct spaces for mountainous encounters. Campbell, van Hout and Huyghe seek a visible engagement with intangible spaces made real. All these artists travelled to Antarctica. Their works reflect a nonorganic environment disturbed and somehow remade by technologies of sonification, visualisation and exploration – science fiction as real as life on Mars.

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