Ingeborg Reichle

ART IN THE AGE OF TECHNOSCIENCE

Genetic Engineering, Robotics, and Artificial Life in Contemporary Art

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Bacteria, Art, and Talbot's Heirs

Since the late 1990s the German artist and photographer Edgar Lissel has been doing highly experimental work with bacteria whose phototactic properties he utilizes to produce photographic images. The process that culminates in these images follows biological laws: light as the source of all life is the motor driving the image creation process. The use of living organisms, as well as the entire process of making images in this unusual medium, furnishes Edgar Lissel with a means to enquire into the interaction of transience, light, and reproduction. The path to the picture is an opportunity for the artist to reflect on the fleeting nature of images; indeed, of all things, including the most robust architecture.[17] In conjunction with a project about a historical memorial, a wartime coastal defense bunker known as "Kilian" in Kiel, Lissel planned to use the structure as a camera obscura to make pictures. Kilian had been only partially demolished by the British in 1946 and was half above and half below the water line; Lissel decided to look for a carrier material for his images that was related to the organic environment of the bunker's interior. He embarked on a collaboration with Donat-Peter Häder from the Department of Biology of Friedrich Alexander University Erlangen-Nürnberg and conducted experiments with blue-green algae, also known as cyanobacteria, for what would become his series *Bakterium–Wasser licht(et) Geschichte* (1999–2000). Cyanobacteria exhibit phototaxis; they have the capability of moving and congregating as a reaction to light that reaches them in accordance with its intensity. Lissel exploited this property to produce images that are visible to the human eye: the image effect is created by the accumulation of bacteria, which move toward the light. Lissel began to grow cyanobacteria, transforming his photography studio into a biology lab in the process. The procedure to produce the new image carrier was quite long and complex: the bacteria were grown in nutrient solution in petri dishes, and then mixed with other components to form an emulsion. In a darkened room a slide projector projected a photographic negative onto this emulsion of living microbes for time periods of several hours to several days. The result was that the bacteria congregated in the petri dish in such a way that they formed a negative image of the bunker in Kiel. They moved out of the darker areas and into the brighter areas of the projected image (Figs. 109 and 110).

This process executed by motile bacteria in petri dishes parallels the process in photography of exposing light-sensitive paper: the areas exposed to light are dark, and the areas where little or no light falls are light. Cyanobacteria, or blue-green algae, are photoautotrophs; via photosynthesis they produce their own oxygen independently, and as autotrophic organisms they reproduce asexually. Their life cycle lasts only a few minutes. Lissel fixed the fragile image formed by the microbes in high-quality photographs, which also allowed him to enlarge

the pictures. In *Bakterium–Selbstzeugnisse* Lissel also used cyanobacteria: magnified microscopic images of the structures of single cyanobacteria were projected onto petri dishes filled with bacteria solution (Figs. 111–114). Thus when these bacteria grew after several days' exposure to the projected light, countless organisms congregated to form a single image of an individual bacterium.

In the series *Bakterium–Vanitas* Lissel used a different method to reproduce the images of objects, the photogram. A fish or an oak leaf, for example, was placed between a petri dish with bacteria and a light source from below (Figs. 115–118). Thus the light shining from below only reached the bacteria that were not positioned under the object, which gave rise to a silhouette of the object in the bacterial culture. This process goes back to the "photogenic drawings" made in the nineteenth century as developed, for example, by the British pioneer of photography William Henry Fox Talbot (1800–1877) in the 1830s. Lissel photographed the images resulting from the organic growth of the bacteria and enlarged them to approximately 31.5 × 31.5 in. The images produced by these bacterial growth processes document the microbes in their ephemeral state; the photograph fixes a transient moment in their life that will endure.

In his ongoing project *Domus Aurea*, begun in 2004, Lissel also uses bacteria of the phylum Cyanobacteria as a living medium that forms itself into images. The starting point of this project was the analysis and investigation of the destruction of the frescoes in the ruined remains of the Domus Aurea (Latin: Golden House) by the cyanobacterium *Leptolyngbya*. The Domus Aurea was one of the most magnificent buildings in Ancient Rome. Built by Emperor Nero in ca. 64 CE after the fire of Rome, most rooms of the vast palatial complex were almost completely covered with frescoes, from the vaulted ceilings to the floors, and faced with ivory and marble. According to contemporary sources other rooms were decorated entirely in gold leaf. The structures above ground were demolished by Nero's successor and other buildings erected on top of the complex. It was only by chance that the surviving subterranean chambers and frescoes were rediscovered several centuries later, in 1480. After their rediscovery the ornamentation and mythical creatures of the frescoes entered the style language of the Renaissance. Lissel has been engaged on research work at this site since 2005, in collaboration with archaeologists and the biologist Patrizia Albertano from the biology department of the University of Rome. For his project *Domus Aurea*, Lissel took samples of the bacteria destroying the frescoes and applied them to plaster panels (Figs. 119–125). For several weeks the bacteria-coated panels were exposed to the projection of a photographic negative image of a fresco from the Domus Aurea that has been almost entirely destroyed. Thus the work foregrounds the interaction and relationship between creation and destruction; the agent responsible for the destruction of the ancient artworks—the bacteria—can, in a different medium, create a new realm of images (Figs. 126 and 127), a bacterial fresco.

In *Myself* (2005), which Lissel created at the same time as working on *Domus Aurea*, the artist used a different type of bacteria to generate images. *Myself* translates the physical into the photographic and also into the biographic. Lissel made impressions of parts of his own body, such as his arm, hand, and feet, in agar solution whereby bacteria from his skin were transferred, or "released," into the nutrient (Figs. 128 and 129). After several days colonies of bacteria had aligned themselves in the form of his body impressions, and his body had created an "organic impression" of itself, of parts of itself.

A similar approach was employed by the artist K.D. Thornton in her work *mE. Coli* (2000), a bacterial auto-portrait that consisted of her own enterobacteria drawn onto the surface of seven large (6 in.) agar plates (Figs. 130–132).[18] Invisible for the first few hours, when kept at the appropriate temperature, body temperature, the images were revealed and flourished throughout the period of the exhibition. Thornton had tried out such imaging processes using bacteria three years before in her project *culturing shame* (1997), for which she learned how to grow bacterial cultures. The starting point of this project was the day when the artist discovered a roadkill garter snake in the lane behind her apartment. Curiosity overcame aversion and she pondered what one might do with such a find. Thornton combined an apple with the dead body of the snake to revisit the beginnings of temptation, the biblical Fall from Grace—it was the serpent that persuaded Adam and Eve to eat the forbidden fruit of the Tree of Knowledge of Good and Evil. Because of their disobedience God made Adam and Eve aware of their nakedness, whereupon they made clothes out of fig leaves and tried to hide from God. In this way something appeared for the first time in Paradise that was unknown before: the feeling of shame.

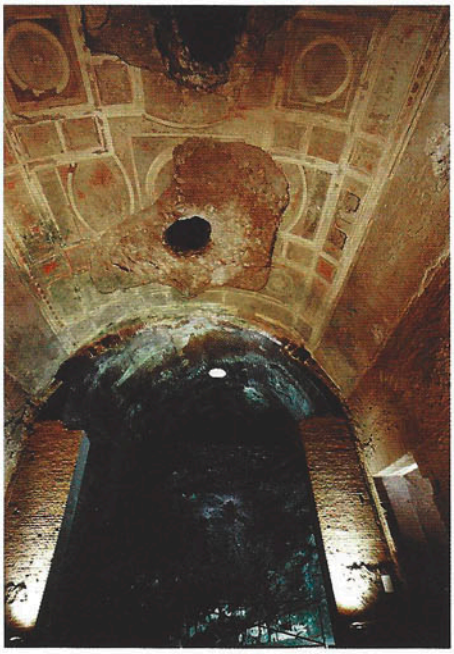
Over the course of three weeks Thornton observed the slow process of decomposition of the apple and the dead snake; possibly the first time in history that a rotting snake and an apple had been monitored by a human. Because the apple and the snake were gradually disappearing the artist had the idea of growing "shame bacteria" from the last bits of apple and snake. After an intensive search for a suitable method, she found a company that sent her the requisite petri dishes and growth medium by air. Thornton chose to grow her "shame bacteria" in the form of a leaf and the individual letters S, H, A, M, E in separate dishes. The letter "S" hardly grew at all except for a waxy yellow dot; "H" was like a lacy field, with satellite cultures sporadically along its form; "A" was the most successful growth, yielding both faint pink cultures and bushy mold; "M" developed strongly along the vertical strokes, with growths resembling chromosomes; and "E" was taken over by a large dark colony near the edge of the dish, probably due to external contamination (Figs. 133–135). Before the petri dishes were consigned to Thornton's refrigerator, they were photographed and documented.

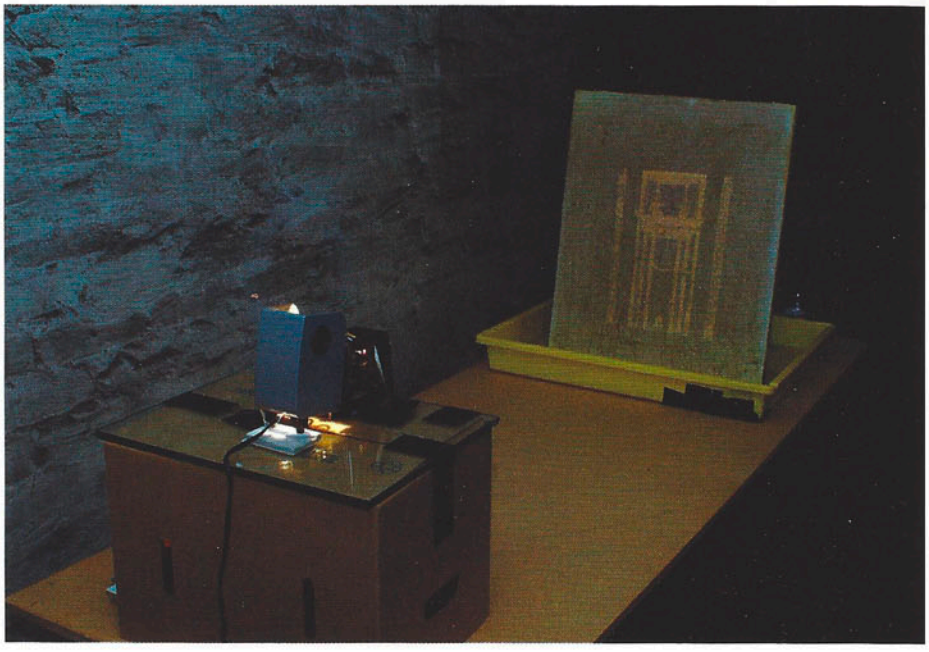
Fig. 109 Edgar Lissel, *Bakterium-Wasser licht(et) Geschichte* (1999–2000), pigmented ink on Hahnemühle PhotoRag paper, original size 31.5 × 31.5 in. (Edition 5), 17.7 × 17.7 in. (Edition 12).

Fig. 110 Edgar Lissel, *Bakterium-Wasser licht(et) Geschichte* (1999–2000), pigmented ink on Hahnemühle PhotoRag paper, original size 31.5 × 31.5 in. (Edition 5), 17.7 × 17.7 in. (Edition 12).

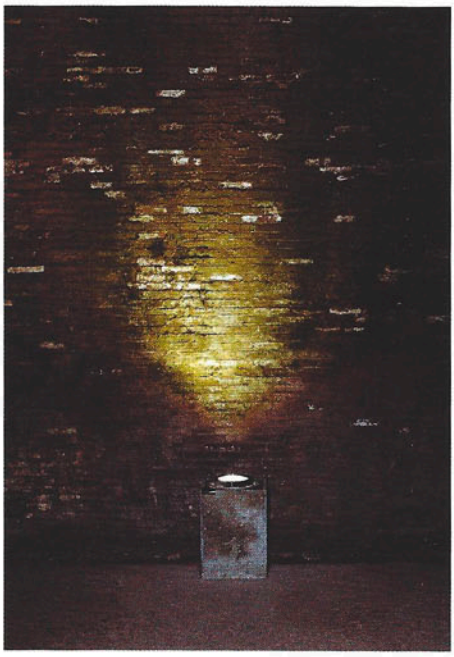
Figs. 111, 112, 113, and 114 Edgar Lissel, *Bakterium-Selbstzeugnisse* (1999–2001), pigmented ink on Hahnemühle PhotoRag paper, original size 31.5 × 31.5 in. (Edition 5), 17.7 × 17.7 in. (Edition 12).

Figs. 115, 116, 117, and 118 Edgar Lissel, *Bakterium-Vanitas* (2000–2001), pigmented ink on Hahnemühle PhotoRag paper, original size 31.5 × 31.5 in. (Edition 5), 17.7 × 17.7 in. (Edition 12).

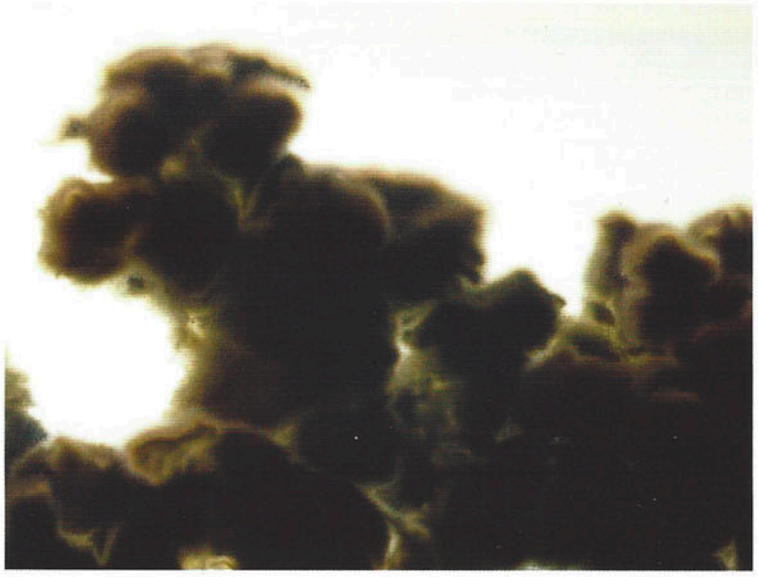




Figs. 119, 120, and 121 Edgar Lissel, *Domus Aurea* (2005). Top left: view of *Domus Aurea* in Rome; top right: detail of the frescoes; bottom: experimental setup with a projector and a plate coated with bacteria.

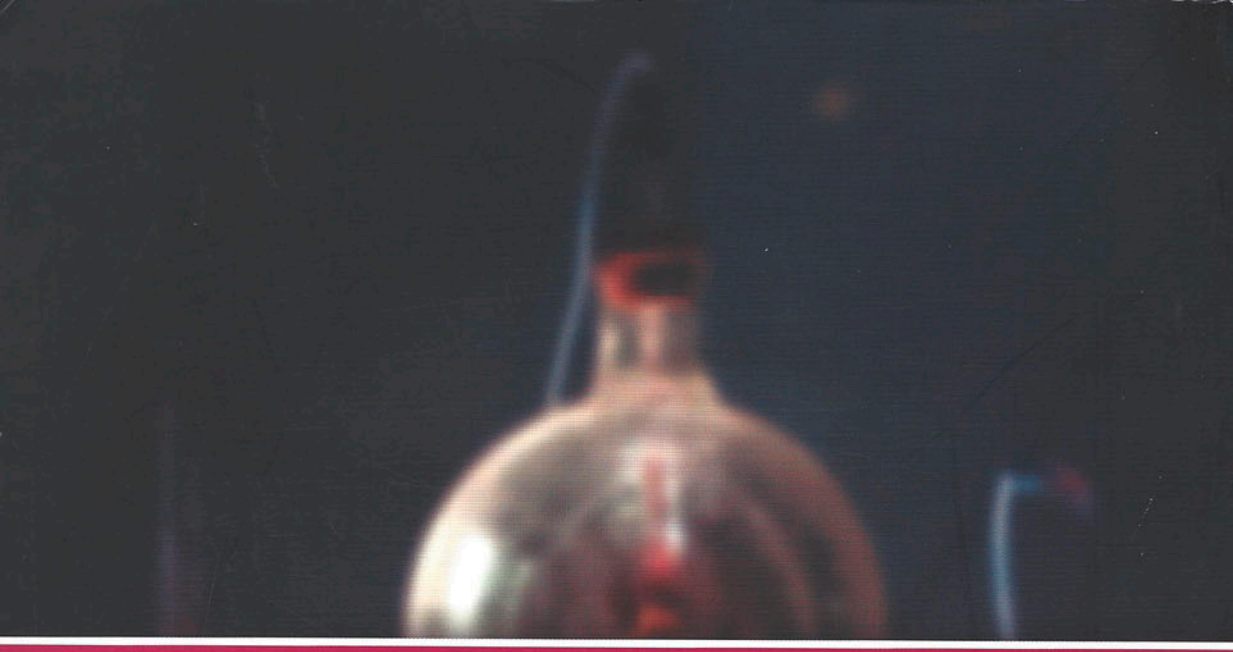



Figs. 122, 123, 124, and 125 Edgar Lissel, *Domus Aurea* (2005). Top: in *Domus Aurea*, left: taking a sample of bacteria from the frescoes; right: illumination of *Domus Aurea* with bacterial growth; bottom: at the Department of Biology, University of Rome; left: growth assay under various light sources; right: archive of bacteria.



Figs. 126, 127 Edgar Lissel, *Domus Aurea* (2005). Bacterial cultures. Original size, C-Print, 23.6 × 31.5 in. each.

Figs. 128, 129 Edgar Lissel, *Myself* (2005). Top: photo of the artist at the Institut für Hygiene und Umwelt, Hamburg, in December 2004; bottom: impression of the artist's arm and view of his body's own bacteria in nutrient solution, pigmented ink on Hahnemühle PhotoRag paper 31.5 × 39.4 in.



Is science the new art? Starting from this provocative question, art historian Ingeborg Reichle examines in her book fascinating responses of contemporary artists when faced with recent scientific and technological advances. In the last two decades a growing number of artists has left the traditional artistic playground to work instead in scientific contexts such as the laboratories of molecular biology, robotics, and artificial life. New art forms like "Transgenic Art" and "Bio-Art" have emerged from the laboratory. These art forms differ dramatically from traditional artistic approaches that explore the natural: they have crossed the boundaries between the artificial and the natural, and thus provoke passionate debates about the growing influence of science and technology. This first comprehensive survey presents a well-selected number of significant artworks and with over 290 colour illustrations provides a broad overview of this new and relevant development in art.

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