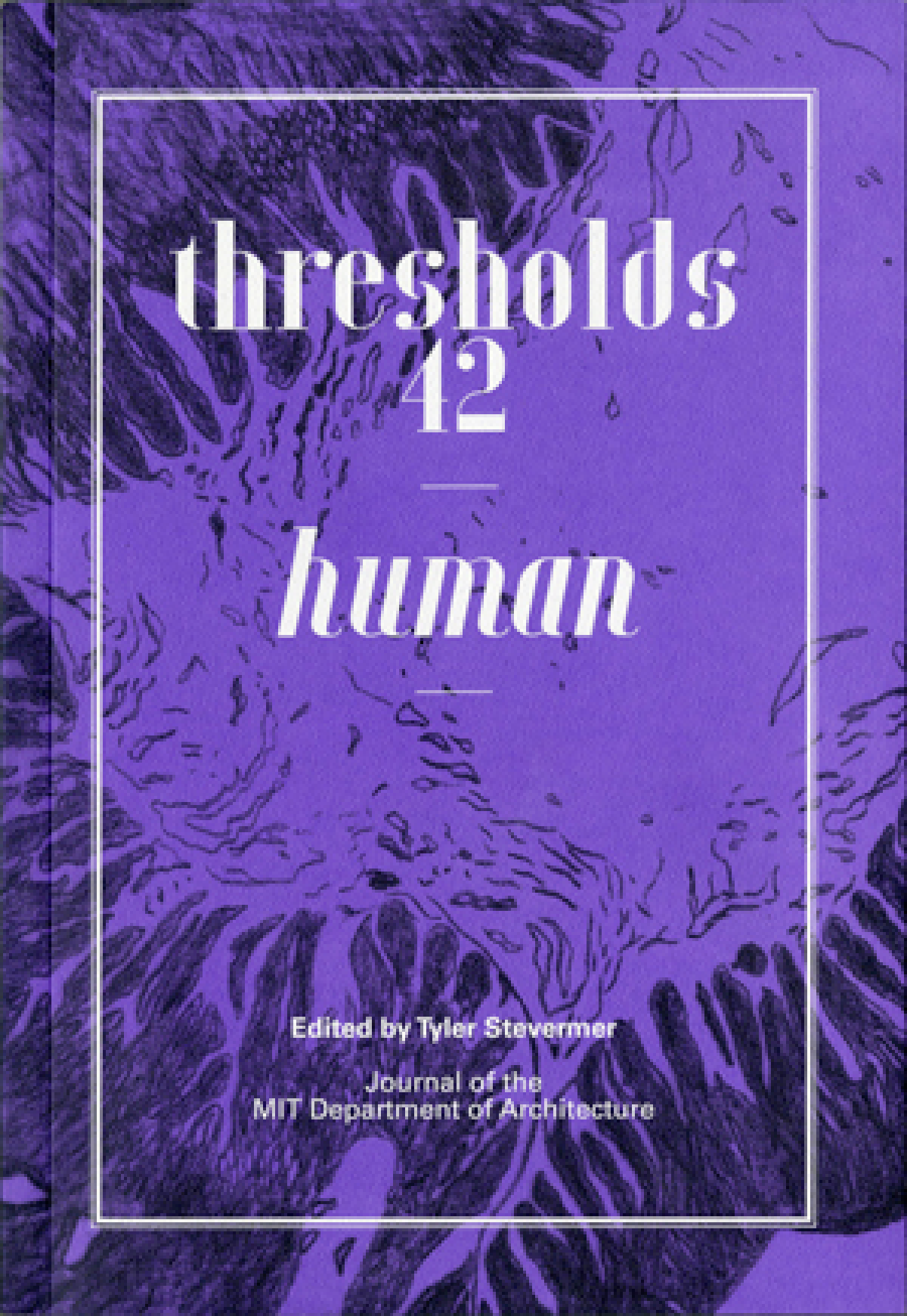
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REFASHIONING THE MICROBIAL BODY

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Definitions of "work" and "self" occupy a blurry territory for Sonja Bäumel. In her 2012 project, *Expanded Self,* bacteria sampled from Bäumel's body formed a bacterial life autonomous from its author, who had placed her own native microbes from single day in a sterilized environment between two panes of glass. In 2009, clouds of multicolored fungi grew from her skin's flora bacteria in a giganticized scientific instrument on her living room floor, representing a second self –both an artifact of the moment of making and a separate trajectory of life parallel to her own, both occupying the same living space.

Her hand, having made a duplicate of her own body and thus blurring the territory between maker and made, evokes a semantic distinction between the accepted term *Homo sapien* (wise man) and another definition of human, *Homo faber* – man the creator.

Translating 'human' as *Homo faber,* one who makes a useful tool from a found object, necessitates the process of production to define human against the thing that is produced. Without abandoning *Homo sapien,* philosopher Hannah Arendt defined *Homo faber* as a contemplation of process, the mind's role in the body's production, necessitating unity between head and hand. But what of the body's self-production– that is, of bacteria– when interfered with by conscious production and intervention by the hand?

Bäumel uses her own body as subject and as a tool to understand how she operates in the larger world. She explores the physical territory between the body and the environment—exploiting the definition of skin in considering the "secret(ive) layer", as she calls it,[1] of the bacterial world atop, and within, the body's membrane. Borrowing Derrida's theory of the parergon,[2] Bäumel's work considers the skin an expand-

1 Sonja Bäumel, "Human Biome/Synthetic Biology and Design" (presented at the Institut für Industrial Design 2 der Universität für angewandte Kunst Wien April 9, 2013), http://www.youtube.com/watch?v=JorQlui9JJo.

2 Derrida writes himself into the irrecuperable absence in his book, *The Truth in Painting* (1987). Borders, he argues, are unstable and therefore fictional because of the ever-present distance between two bodies, between the *ergon* and the *parergon.* The border helps create an idea of difference and separation between entities–it in fact helps create the idea of entities as such. Believed to be there, and clearly demarcating difference, the border can never actually be reached.

Textured Self by Sonja Bäumel, 2011. A work commissioned by the Textielmuseum Tilburg

ing "living landscape" without a true limit or contour, and instead, part of a symbiotic ecosystem between the body's internal organs and the external environment. In the process of making *Expanded Self*, a fissure emerged to expose the space between the bacteria and the pane of glass. Bäumel considers this crucial to the integrity of the work, an artifact of the story and the interface between life and art, between body and environment.[3] While documentary, Bäumel sees potential in the bacteria on our skin as a hidden platform for new and unexpected body-environment interfaces–that is, interpretive clothing.

Sonja Bäumel's background in fashion design informs her later work that emerges from scientific data and "mediates between art and science, fashion and science, design and science, between clothes and body, between fiction and facts."[4] Working alongside scientists in the laboratory, she discerns scientific information to create visual interpretations, which continually feed back into her research through making.

Expanded Self by Sonja Bäumel, 2012

3 Sonja Bäumel, "Human Biome/Synthetic Biology and Design" (presented at the Institut für Industrial Design 2 der Universität für angewandte Kunst Wien April 9, 2013), http://www.youtube.com/watch?v=JorQlui9JJo.

4 "About Me," Sonja Bäumel, accessed November 2013, http://www.sonjabaeumel.at/info/about-me.

Bacteria Textile Experiments by Sonja Bäumel, 2009
photo credit: Sonja Bäumel

Engaging the emerging field of synthetic biology, Bäumel transforms a useful "material" for the body's ecosystem, bacteria, to serve a second purpose, clothing, which previously has been made from material found elsewhere. Allowing the *made* to emerge from the very body of the *maker*, she has redefined self and work as a diametric relationship in an infinitely reversing loop.

Although invisible without scientific tools, microbes make up a larger percentage of human bodies than "human cells" by a factor of about ten. Further, the body's "microbiome" is composed of 3.3 million genes, while the human envelopes only 20-25,000 genes.[5] These numbers invite questions of "who feeds whom?" or "who *makes* whom?" Bacteria and fungi on and in our bodies protect us from illness and disease—but Bäumel asks if we can harness these numbers and make the human microbiome visible, potentially offering visible and adaptable protection to the body.

The artist's critical and cultural perspective gives science an opportunity to imagine, and therefore question, existing definitions within the scientific domain. Arendt's theory that humans can know only what they create themselves gives credit to Bäumel's series of self-portraits in thread and bacteria that she bred (on and off her body) as experimental

5 Baoli, Zhu, Xin Wang and Lanjuan Li, "Human gut microbiome: the second genome of human body." *Protein & Cell* 8 (August 2010): 718-725.

investigations of the hidden connections between humans and the microworld. While making visible what we are most often unaware of, the artist has created a tool to interact with scientists through visualization and tactility to expand scientific findings and their communication to other bodies of knowledge and citizens.

As *designer*, Bäumel intercepts biology's process to craft a parallel, or mock, microbiome. Once removed from the living organism the artist's body is consciously and visually articulating another, distinct body as an adaptable proxy. The artist finds herself in the same existential predicament as author Paul Auster's character, Quinn, in the short story "City of Glass," whose work is a vessel for life. Continuously slipping between presence and absence and protagonist and author of his own story, Quinn and his work as both a writer and a private eye detective exist reciprocally in a relationship that unravels as the story is read. Auster appears in the narrative and Quinn's environment, work, and eventually, *self*, disappear in response.[6] Auster's short story winds through the phenomenon of creating work that operates and even reproduces autonomously outside of the author's control, and ultimately, in the service of the author. Bäumel uses her own body to expose the active mutual production between microbes and human cells with a visually augmented skin. Once placed atop the living organism to render the invisible visible, a different set of needs is addressed.

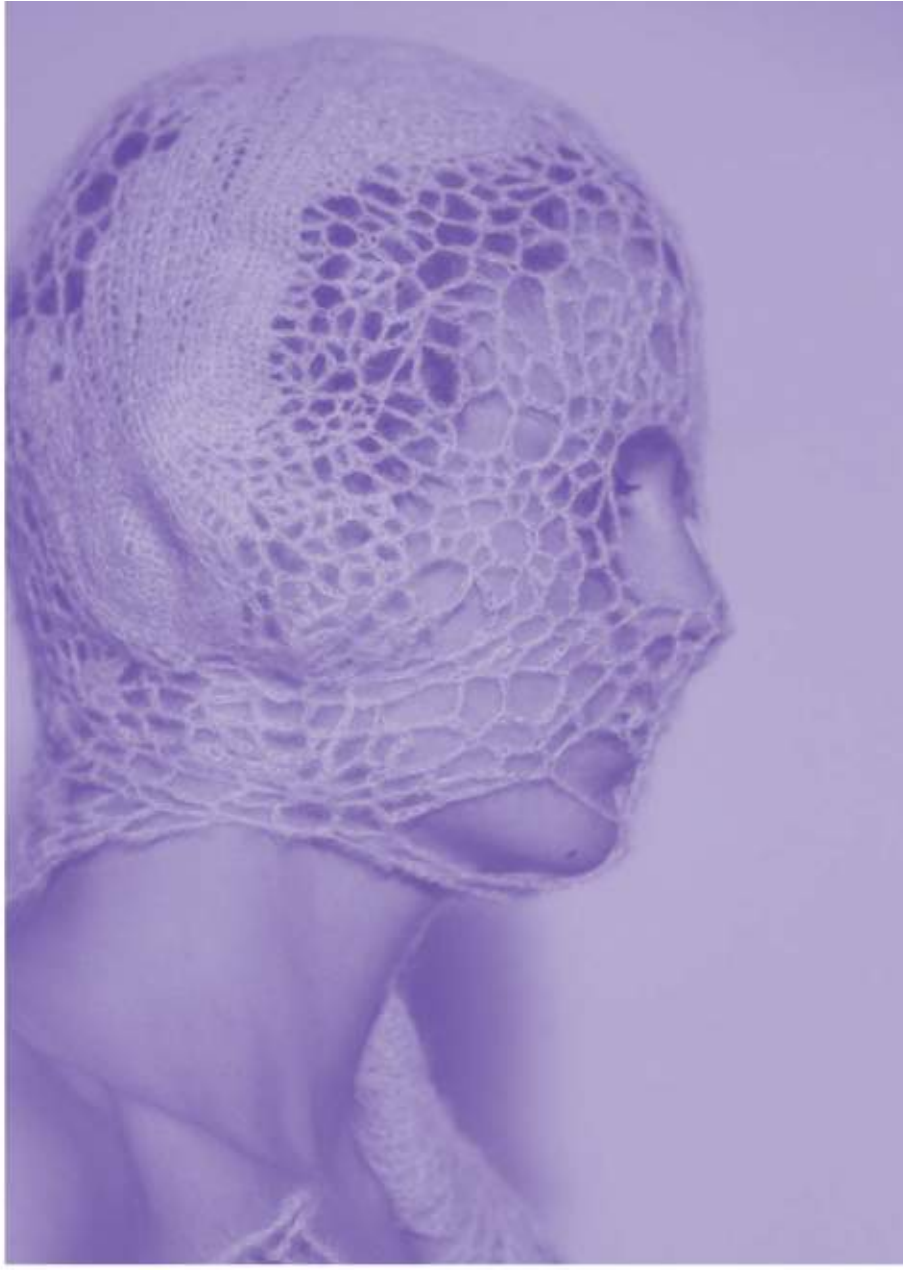
The aforementioned *Oversized petri dish* is part of a larger series of work named *(In)Visible Membrane*, which also includes *Crocheted Membrane, Bacteria Texture, Visible Membrane I, Bacteria Textile* and the *(in)visible film. Visible Membrane I* challenges ideas of clothing as camouflage, protection and decoration by wrapping a mannequin with highly reactive wool excluding a window into an exposed belly, where a petri dish displayed the reaction between the bacteria on the skin with the wool. This project, of course, introduces new questions in the model as mannequin, with a false skin. If not abiogenesis, the bacteria must be transposed from another living body. Still, the work conveys the message that we should harness the "existing invisible infrastructure on our skin"[7] and visualizes Arendt's understanding of *Homo faber* as "metabolism with nature."[8]

6 Paul Auster, "City of Glass" in *The New York Trilogy* (New York: Penguin, 1985), 9-10.
7 "Visible Membrane I," Sonja Bäumel, accessed November 2013, http://www.sonjabaeumel.at/work/bacteria/visible-membrane-i.
8 Hannah Arendt, *The Origins of Totalitarianism* (New York: Schocken, 2004), 612 and 628.

Visible Membrane I by Sonja Bäumel, 2009
photo credit: Rene van de Hulst

Drawing inspiration from the behavior of the bacteria she studies, Bäumel reimagines clothing as a responsive layer that can adjust to variations in temperature in the same way as internal metabolic processes. Her graduate thesis at the Design Academy Eindhoven reframed clothing as a membrane with the same type of knowledge as the skin bacteria populations unique to each person, flexible to morph in different environmental conditions. A crocheted open system with variable apertures and densities for use in different climates developed from her research on the sensitive slime fungi, which have no cell walls and react quickly. Her concept of clothing does not derive in the same way as most fashion design, from shape or historically patterned form with embedded social hierarchy and material richness, but is instead determined by the needs and sensations of the human body—performing in the same way that bacteria populations individually respond. One of the key phenomena in Bäumel's latest body of work under the title *Metabodies* is quorum sensing, low-threshold communication among bacteria that enables them, by means of chemical reactions, to jointly regulate the number of bacteria in a particular environment and to adapt their "behavior" accordingly.

Crocheted Membrane by Sonja Bäumel, 2008/09
photo credit: Wing Lam Kwo



Crocheted Membrane by Sonja Bäumel, 2008/09
photo credit: Maurizio Montal

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Crocheted membrane translates scientific data into a fine-tuned aesthetic language, less coverage on areas where the body needs less warmth and more fabric on cold body zones, determined by the skin's transmission of information to the external, crafted layers. Mimicking the behavior of bacteria colonies, textiles are situated as a visual arbiter between bacteria (sensors for the skin) and the environment.

Unsatisfied by the facts, *Textured Self* (2011) is an interpretation the analyzed data sets in an oversized hand-knit and crocheted body, a new silhouette based on the bacteria found on specific zones of her skin on an isolated day. The piece focuses on 20 body zones and articulates the "microcosmos" into a "macrocosmos" through color, texture and structure. Bäumel writes that she aims "to inspire, provoke questions and confront people with the fact that the human is a hybrid, a super organism" that demands the unique relationships between the different forms of life on the body. In this sense, the bacteria populations are tools to make her work, which is ultimately a tool to communicate the dynamic internal/external relationships of human bodies. Bergson defined human intelligence as "the faculty to create artificial objects, in particular tools to make tools, and to indefinitely variate its makings."[9] Once this work is out in the world, in this case through an exhibition at the Textielmuseum Tilburg, it becomes more than an artifact of the body it represents, but a tool of variable interpretations and considerations of the human composition. Quorum sensing could therefore inform and morph fabric in ways beyond density, but for Bäumel, the question of the body's inherent systems of communication informs her deployment of synthetic biology, rather than the skin driving engineering and programming of new clothing.[10] Bäumel considers the social implications of these dramatic changes in fashion: "How would our interaction change if I could adapt to local conditions? Would social integration occur if I could adapt externally?"[11] The artist has transferred partial agency to the work by separating from her skin in a search for self.

9 Henri Bergson, *Creative Evolution*, tr. Arthur Mitchell, (New York: Henry Holt and Company, 1911).
10 Bäumel, Sonja, e-mail message to Mariel Villeré, December 2013.
11 Michael Knoll, "Sonja Bäumel: Metabodies," *Ars Electronica Blog*, July 29, 2013, http://www.aec.at/aeblog/en/2013/07/29/sonja-baumel-metabodies/.