Epidermitec-ture:

Co-Existing on the Surface

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During your next walk in your neighbourhood, along the streets and familiar paths, take a closer look at the surfaces of the buildings you encounter. If you look really close, you'll start noticing—maybe for the first time—the stains on coated concrete, the spots on painted walls, on shiny glass facades, on glazed bricks, smudges on lacquered wood, on stainless steel elements, and on plastic details. Where do such stains come from? Are they of human or nonhuman origin? What shape are these stains? How would you describe them? What is their colour? Where are they located? Come closer to the architectural skin and try to touch and smell it: What do they smell like? Are they soft or rather hard to touch?

We rarely perceive stains or spots formed on uniform surfaces or notice any discoloration of static facades. If we look 'deep' enough, however, we will discover that stains are in fact a thin organic layer, called biopatina, naturally forming on all surfaces as the direct result of the interaction of the surface's material with the environment. The interspecies cooperation of microorganisms forming biopatina does not require special treatment, artificial watering, fertiliser, or even our attention. This essay explores the layer of microorganisms on architectural organic skin—a phenomenon we call epidermitecture[1] *—with the aim of addressing ecological challenges that are the components of a single crisis, which is largely a crisis of perception.*[2]

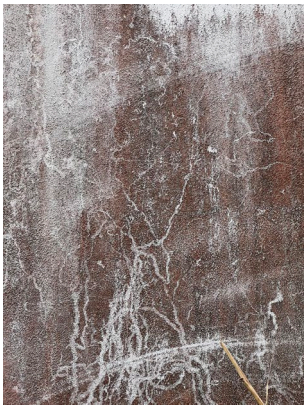

Fig. 1.01 Biopatina on a concrete wall in Vienna ©Adam Hudec

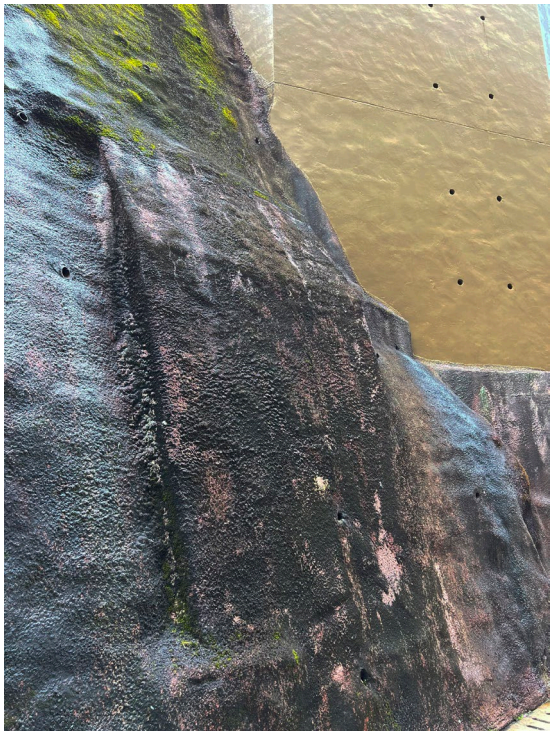

Fig. 1.02 Biopatina on a concrete wall in Hong Kong ©Adam Hudec

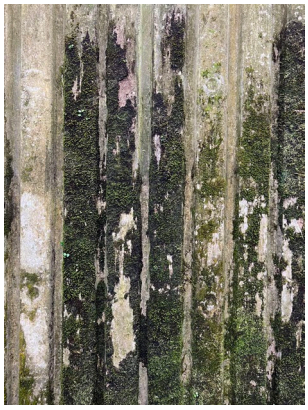

Fig. 1.03 Biopatina on a concrete wall in Hong Kong ©Adam Hudec

[1] The term "epidermitecture" was suggested by Professor Michelle Howard in March 2021 to name a phenomenon describing a thin layer of nonhuman deposits on architectural organic skin. Professor Howard made the suggestion during an initial discussion about a new interdisciplinary project between geomicrobiology and architecture that would investigate biopatina on outer surfaces.

[2] Similar methodologies of research in re-defining 'how we understand the world' as explored later in this essay are suggested by David W. Orr, *Earth in Mind: On Education, Environment, and the Human Prospect* (Washington, DC: Island Press, 2004).

Almost all architectural and urban surfaces are conditioned to be maintained and protected with weather-resistant coatings to obtain their desired state,[3] yet all material components go through an inescapable cycle of changes. This inevitable transformation, which affects all material surfaces, is not only caused by dynamic forces such as wind and rain, but is also the result of microorganism activity. Any naturally occurring stains on surfaces are usually considered a subject of removal, dating back to the ancient Greeks and their ceremonies of cleaning sculptures during festivities.[4] What happens when we question what the outside of a building needs to look like and why? And how might this deepen our understanding of what grows on the surface?

Biopatina, a thin layer of microorganisms on architectural organic skin (fig. 2.01), is a symbiosis of cyanobacteria, microalgae, fungi, and lichen that metamorphose, change, and respond to its environments. The results of their activities affect how material surfaces transform visually in terms of colour, texture, and structural integrity. In this essay, we are primarily concerned with biopatina's microorganisms and their ability to restore and regenerate the environment while exploring their cultural, visual, and sensual potentialities. Furthermore, acknowledging microbial life is essential for conceiving functional and lasting models for co-existence in contrast to anthropocentric assumptions that arguably propelled us towards the imminent destruction of our habitat and the layered crises which we are collectively confronted with.[5]

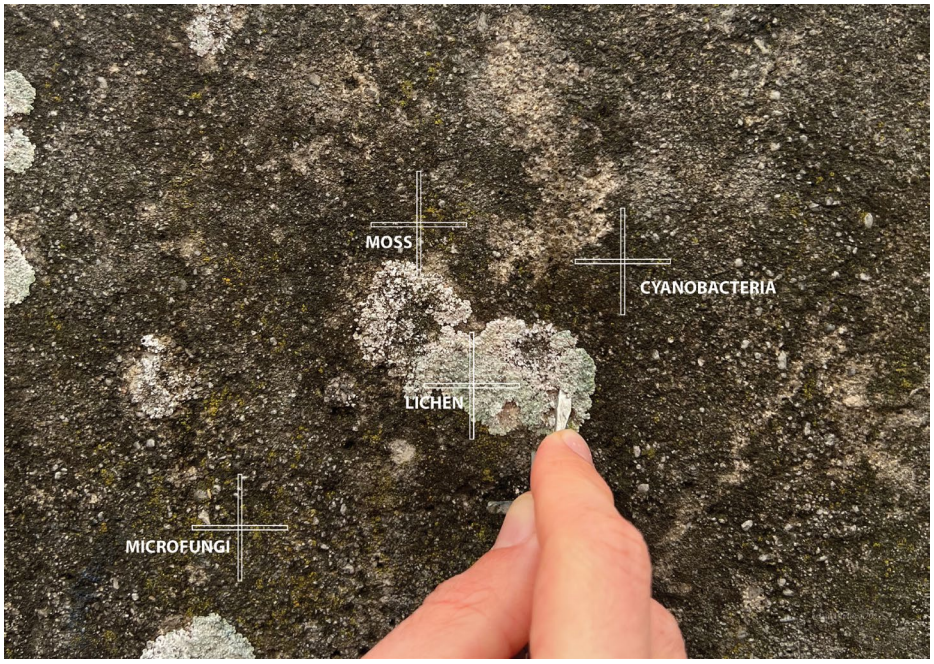

Fig. 2.01 Biopatina as a synergy of cyanobacteria, microalgae, microfungi and lichen ©Adam Hudec

[3] For a discussion about the protective layer of paint, see Ingrid Halland and Marte Johnslien, "'With-On' White: Inconspicuous Modernity with and on Aesthetic Surfaces, 1910–1950," *Aggregate* 11 (January 2023).
[4] Greek sources refer to the ritual attention to and ordinary maintenance of marble sculptures as *therapeia*, *kosmesis*, and *apikosmesis*; Elisabetta Neri, Nesrine Nasr, and David Strivay, "Ancient Restoration in Roman Polychromy: Detecting Aesthetic Changes?", *Heritage* 5, no. 2 (2022): 829-848, https://doi.org/10.3390/heritage5020045.
[5] As argued by numerous scholars within the posthuman turn, see for instance Timothy Morton, *Hyperobjects: Philosophy and Ecology after the End of the World*, Posthumanities (Minneapolis: University of Minnesota Press, 2013).

The contemporary architectural discourse places a premium on surfaces that are new, or at least appear to be new, rather than those that transform, live, and become.[6] The value of a surface in this context is often judged by its ability to keep itself stain-free, which entails the erasure of any nonhuman life form that emerges on the architectural organic skin, or in other terms, on the *epidermitecture*. By noticing endlessly purified surfaces, we begin to understand the extent to which architectural practices have been marked by the disregard for nonhuman life. Indeed, in the anthropocentric world, nonhuman bodies are one example of what Julia Kristeva calls paradigmatic abject objects: impure, inappropriate for a public display or discussion.[7] Kristeva's notion of abjection provides a helpful framework for positioning biopatina as unruly bodies, attesting purity as the foundation of human world-making.

If the attempts to separate architecture from epidermitecture have contributed to an anthropocentric worldview, which methods can be used to make us notice this thin layer of microorganisms on architectural skin? If the efforts to hide or remove traces of microorganic growth—biopatina—on architectural surfaces is considered a component of the current crisis of perception, how do we make biopatina visible?

Contemporary artistic practices have taken on the challenge of exploring the roots of abjection in society and counteracting them with practices of inclusion and heterogeneity. One of these endeavours is the Dusts Institute,[8] an artistic research platform based in Vienna and co-founded by Adam Hudec, one of the authors of this essay. As part of their interdisciplinary artistic research practice, the Dusts Institute developed a collaborative tool called Dusts Catcher Kit that can successfully transform abjected, invisible airborne dusts into tangible, aesthetic objects. Dusts Catchers are kits of knowledge instruments that negotiate partnerships with human and nonhuman agents. These instruments were inspired by the scientific method of ambient air sampling where pollutants carried by air are captured on a medium—usually, various types of fabric—and analysed later to determine the amount and composition of airborne pollutants.

[6] See Mette Ramsgaard Thomsen and Martin Tamke, "Towards a Transformational Eco-Metabolistic Bio-Based Design Framework in Architecture," *Bioinspiration & Biomimetics* 17, no. 4 (2022).

[7] Julia Kristeva, *Powers of horror: An essay on abjection* (New York: Columbia University Press, 1982), 9.

[8] Dusts exist only in a plurality that cannot be counted, identified, or reduced to one single element. Dusts is a collective of nonhuman, organic, and inorganic components. Therefore, we refer to dust always in the plural, especially in the context of Dusts Institute, as a reference to more than one (kind of) dusts.

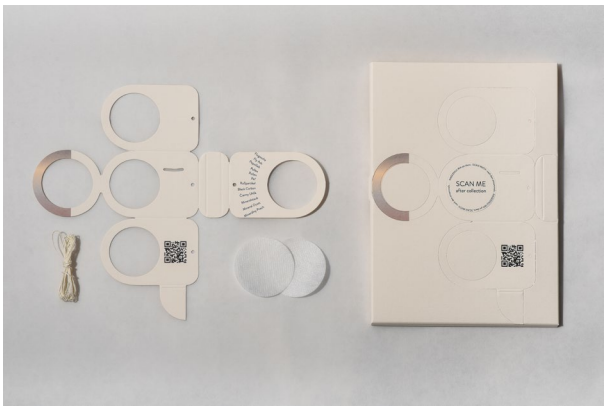

Fig. 3.01 Dusts Catcher Kit ©Joanna Pianka

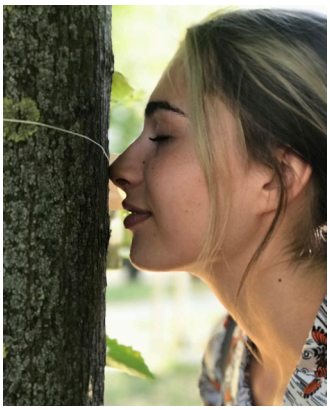

Fig. 3.04 Olfactory excersice ©Adam Hudec

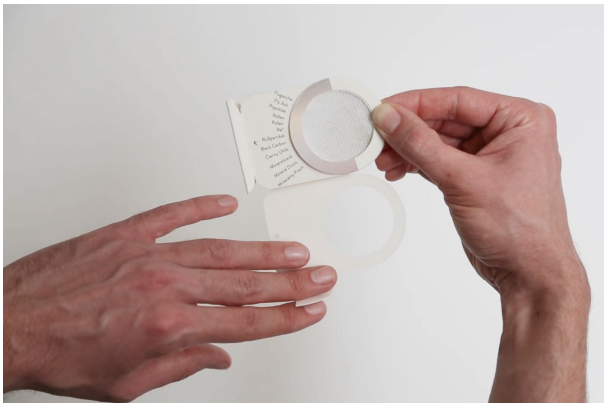

Fig. 3.02 Identification of collected dusts after collection ©Adam Hudec

Fig. 3.05 Dusts Collecting Workshop ©Joanna Pianka

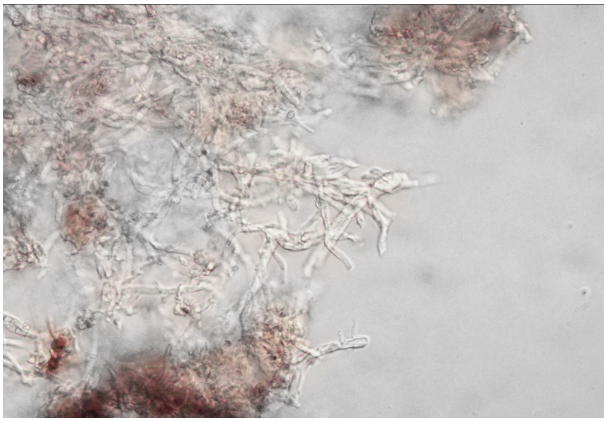

Fig. 3.03 Microscopic image of funghi collected on Dusts Catcher Kit ©Adam Hude

Fig. 3.06 Dusts Collecting Workshop ©Joanna Pianka

By organising public dusts collection walks, the Dusts Institute started to experiment with the notion of augmenting the senses of the workshop participants in order to locate airborne dusts from a nonhuman perspective. During the workshop, the participants not only visually observed and touched surfaces but engaged their noses to detect particulate matter in the air, since airborne dusts are a carrier medium for scent particles. Among the discovered collected specimens were inanimate bodies of particulate matter and also living bodies of microorganisms, floating in the environment awaiting their new interactions on architectural organic skin. This discovery ultimately inspired the framing of the notion of epidermitecture as a new phenomenon and the start of an interdisciplinary experiment between an architect, an art historian, and microbiologists based on creative methods such as dusts collective walks, biopatina collection and analysis, public installations, and interventions. The performative practice of thinking, observing, and theorising called into question the full spectrum of the world in which we live. By participatory co-creation methods, the Dusts Institute made imperceptible, abject objects visible and used aesthetics as a tool for making visible the complex environment beyond our human perception.

A similar approach was applied while investigating biopatina on architectural organic skin in Prague's underground station Vltavská. The speculative intervention *Nightmare Turned Into a Dream* (2022)[9] asked the questions: what if naturally occurring stains on architectural surfaces were given critical attention? And how to make visible epidermitecture? As part of the intervention, the thin layer of biopatina was subjected to a thorough scientific and aesthetic analysis in order to celebrate the phenomenon and move away from the established principles in which the city and architecture serve primarily human needs. As discussed by Karen Barad, science not only investigates, discusses, and observes the world, but actively creates the world through scientific practices. In other words, what is considered a scientific fact is the result of interactive processes connected with presumptions, expectations, ideas, and their visualisation.[10] Therefore, the methods used in *Nightmare Turned Into a Dream* were based on scientific experiments; visual outcomes of the microscopic scientific analysis were subjected to artistic depictions. These images were shown in direct relation to biopatina on the site of the installation in a variety of scales, to comprise coexistence between human-made surfaces and nonhuman life as the results of biochemical processes that are usually hidden from our perception.

[9] *Nightmare Turned Into a Dream* was an outdoor public exhibition by Adam Hudec and Adam Novotník commissioned by Prague City Gallery. See: https://www.ghmp.cz/en/exhibitions/adam-novotnik-a-adam-hudec-nocni-mura-pretvorena-v-sen/.

[10] Karen Barad describes this concept as "agential realism" in *Meeting the universe halfway. Quantum physics and the entanglement of matter and meaning* (Durham: Duke University Press, 2007), 140-141.

The installation took the form of a secondary aluminium structure based on the grid of the existing architectural surface (fig. 4.01-4.03). This made the intervention act as a skin of the already existing architecture, pointing to the fact that biopatina has the ability to absorb toxic substances from the surrounding environment, such as pollutants from the nearby highway. The evocative idea of the transformation of the passive highway surface into an active habitat is a utopian provocation; vast stain-free concrete surfaces could metamorphose once we acknowledge microbial life on architectural organic skin. In this sense, other forms of life on the architectural surfaces are not disregarded through the act of 'removal,' but in fact, amplified.

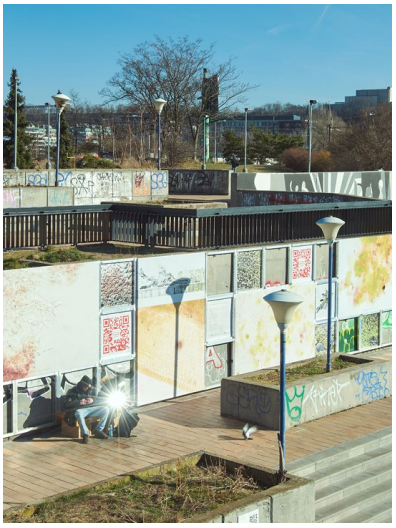

Fig. 4.02 Intervention as a second skin ©Tomáš Zumr

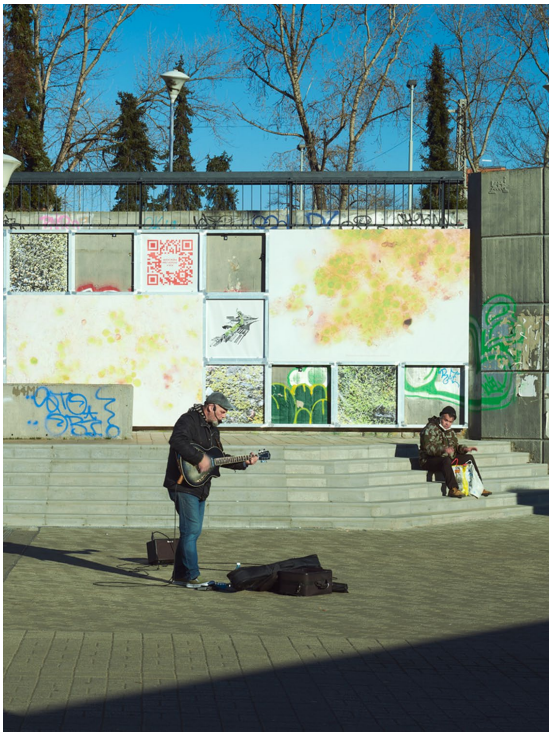

Fig. 4.01 Nightmare Turned Into a Dream ©Tomáš Zumr

Fig. 4.03 Acknoledgement of microbiol life ©Adam Hudec

In the field of science, processes of material interaction have been explored by geo-microbiologists who have undertaken investigative work on the interactions between microorganisms and the world. Geo-microbiologists study how the environment was shaped by nonhumans that already existed 3.8 billion years ago.[11] Research on microbiological intra-actions shows that they maintain the fluxes of matter between the atmosphere (air), lithosphere (rocks), and hydrosphere (water) in the form of biogeochemical processes.[12] The first scientist who applied these findings to the study of interactions on the epidermitecture of cultural heritage buildings was Wolfgang E. Krumbein. In the 1980s, he investigated the organic synergy of architectural organic skin on St. Peter's Cathedral in Cologne and St. Stephen's Cathedral in Vienna, thus shaping a new generation of scientists.[13] Restorers and conservationists explored the complexity of these processes while maintaining architectural heritage buildings. However, the aim was to suppress rather than support biogenic growth on architectural organic skin. Endless efforts to maintain surfaces of heritage buildings as stain-free and employ scientific findings about material interaction—not in favour, but against, any biogenic growth—could in some cases misinterpret the intention of an original architectural concept.

Fig. 5.01 Villa Tugendhat in 1930 ©Rudolf de Sangalo

Fig. 5.02 Villa Tugendhat in 2018 ©Villa Tugendhat Study and Documentation Centre

For instance, the material interaction with the environment and the facade of the UNESCO heritage building Villa Tugendhat—designed by Ludwig Mies van der Rohe and constructed in 1930 in Brno, Czech Republic—prevent the consistent look of its outer surfaces as it is usually mediated through, or handed down by, historic and contemporary images (fig. 5.01- 5.02). Visitors might get surprised once they arrive at the main entrance of the villa; the facade of the iconic modern house is neither white nor uniform. Instead, the entire outer

[11] See Henry Lutz Ehrlich and Dianne K. Newman, *Geomicrobiology* (New York: CRC Press, 2009), 606.
[12] Lynn Margulis and Dorion Sagan, *Microcosmos – Four Billion Years of Microbial Evolution* (Los Angeles: University of California Press, 1997), 300.
[13] Katja Sterflinger et al. (1996), *Patina, Microstromatolites and Black Spots as related to Biodeterioration Processes of Granite. EC Environmental Research Workshop on Degradation and Conservation of Granitic Rocks in Monuments. Santiago de Compostela, Nov. 28-30, 1994*, pp. 391-397.

surface is cloudy, mainly on rainy days, as the facade is coated in a weather-dependent (lime) finish (fig. 5.03). Mies van der Rohe famously claimed that his architecture was “skin and bones”, and the outstanding material selection followed his logic. Villa Tugendhat’s outermost lime skin is covered with fine marble powder with locally sourced sand pigments, creating a creamy appearance on outer surfaces. The colour gradually metamorphoses, changing its appearance over time as it interacts with the surrounding environment (fig. 5.04). Mies van der Rohe highlighted “how important, especially in modern architecture, the use of fine materials is, and how it had been ignored until then, even, for example, by Le Corbusier.”[14] Mies was more interested in the high quality that was already present in the materials than just the materials themselves. Furthermore, Greta Tugendhat has explained that “originally our house was to be a brick building, but it turned out that there were no handsome bricks in Brno and also no masons who could have laid them perfectly.”[15] Clearly, Mies emphasised local knowledge of craftsmanship and local fine materials when designing the surfaces of Villa Tugendhat. Although research on Mies’ use of materials, the construction, and the concept of Villa Tugendhat is vast, we do not know how the surfaces of the Villa were perceived in 1930, how biogeochemical processes altered actual colour gradients, and how nonhuman life affected its visuality. Nevertheless, based on Mies’ profound knowledge of local fine materials and craftsmanship, we can estimate that he was aware of the weather-dependency of the chosen lime finish. We can even speculate that the material interaction of the villa’s outer surface with the environment was expected or even planned by the architect, since the nature of lime finish is generally cloudy, not uniform and weather-dependent.

Fig. 5.03 Cloudy stains on outer surfaces of Villa Tugendhat ©Adam Hudec

Fig. 5.04 Interaction of the lime facade with the environment ©Adam Hudec

Fig. 5.05 Biogenic growth on Villa Tugendhat ©Adam Hudec

[14] Grete Tugendhat, lecture in the Brno House of Arts in Czech on 17 January 1969.
[15] Grete Tugendhat, lecture in the Brno House of Arts in Czech on 17 January 1969.

The ongoing notion of preservation, employing the original's materials and crafts, tries to maintain the appearance of Villa Tugendhat as "frozen in time" and ignores the interaction of its outer surfaces with the environment. However, the definition of the reference or the original surface material must be based on adequate studies and documentation of the original historical and technical facts in order to preserve the cultural values inherent in it. This information-gathering involves an assessment of the architectural organic skin and procedures of the supports and surface layers as well as capturing historic information about the design and building history. How urgent and necessary are the efforts to eliminate the aesthetically distressing changes to Villa Tugendhat's initial appearance and the intended architectural organic skin?

Given the relevance and complexity of the facade's biogeochemical processes, it makes little sense to conduct examinations without a multidisciplinary approach. By collecting, analysing, cultivating, and representing the biopatina of Villa Tugendhat together with microbiologists and conservationists from the Academy of Fine Arts in Vienna, we are currently (spring 2023) trying to establish new ways to maintain buildings by proposing so-called 'bio-restoration'[16] of the cultural heritage.

By celebrating rather than suppressing nonhuman biogenic growth on the architectural organic skin, we propose to coexist with nonhuman life forms that are an intrinsic part of architecture and the environment. Based on the preliminary result of our study, it is not necessary to maintain the outer surfaces of Villa Tugendhat biopatina-free, as intended in current maintenance practice, but rather explore its potential to protect and regenerate both the surface and the environment. Observations made on-site led us to the discovery that biopatina is often perceived as the result of a technological error: it is usually found in places where the interior penetrates the exterior, in small cracks, in moist corners, and in places that nurture and support biopatina growth. This coincides with Tim Ingold's distinction between the paved ground in cities and the ground in the countryside in his keynote essay for *Metode*: "The ground [as soil] is not an interface, it is not hard, [...] it is not a surface of support, but a medium. Plants grow in the ground; they don't rest upon it. [...] The ground is not a coherent foundation at all, but an indistinct and permeable limit of illumination. [...] The ground exemplifies what I want to call a deep *surface*." Microorganisms create and enable 'deep surfaces' by writhing, wiggling, pushing, pulling and turning the inside outside. The result of this interpenetration can be sensed as biopatina on architectural surfaces.

[16] Bio-restoration is a term used to describe the methodology of interdisciplinary research and will be investigated in the upcoming exhibition in Villa Tugendhat (February – May 2023).

Fig. 6.01. Observation of Biopatina on Villa Tugendthat ©Adam Hudec

Fig. 6.04. Preparation of Biopatina samples in the laboratory ©Adam Hudec

Fig. 6.02. Collecting samples of Biopatina ©Adam Hudec

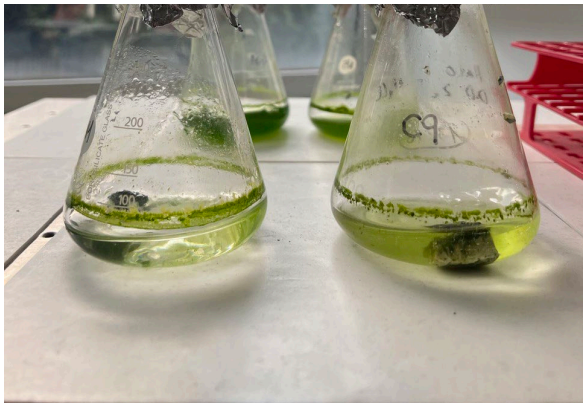

Fig. 6.05. Cultivation of algae in the laboratory ©Adam Hudec

Fig. 6.03. Cyanobacteria colony sampling ©Adam Hudec

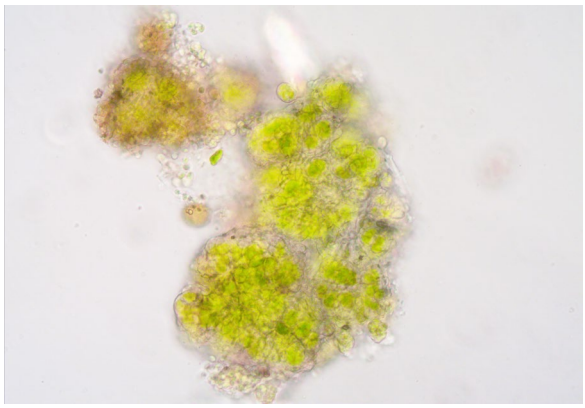

Fig. 6.06. Analysis of collected sample with microscope - algae ©Katja Sterflinger

To better understand the formation process, imagine any architectural organic skin as an example. The first nonhumans are typically cyanobacteria and algae that can obtain their nutrients from the material of the surface and the sunlight. Other microorganisms like fungi can establish themselves as secondary bodies once the cyanobacteria and algae have settled on the surface and fungi can obtain organic nutrients from them. The multispecies development of biopatina depends on the first two steps of the formation process: environmental pre-condition and human intervention (mechanical or chemical removal). Most of the surfaces are maintained, cleaned, and coated in a way that prevents multispecies biopatina from being formed and penetrating the surfaces. Although the first and second layers of architectural organic skin are almost imperceptible to human senses (they appear only as a mild discoloration of uniform surfaces in green, brown, or black gradients), one could start to engage with the tactile, visual, or olfactory experiences of multispecies biopatina covers on *epidermitecture*.

The fact that organic and inorganic matter are crucial agents and have an unmistakable impact on architectural surfaces and thus on environmental health, and vice versa, justifies studying and investing in the field of bio-restoration. Just as architecture cannot be separated from nonhuman activities, so does human existence depend on inter- and intra-species relations: we depend on other forms of life, we rely on a plethora of microorganisms, cellular responses, and inorganic and organic artefacts that inhabit our bodies, as well as the socio-economic mechanisms that produce and replicate the conditions that shape our daily lives. This is also true of architecture. As human-built environments are the product of nonhuman and human assemblages, they become the target of biopolitical and cultural-socio-ecological practices that police and dissect humans from nonhuman bodies.[17]

Fig. 7.01. Biopatina in Sheung Wan, Hong Kong ©Adam Hudec

Fig. 7.03. Biopatina on urban surface in Vienna ©Adam Hudec

Fig. 7.02. Microfungi on concrete surface in Prague ©Adam Hudec

[17] One striking example is the inseparable history of diseases and architecture as investigated by Beatriz Colomina, Nick Axel, and Nikolaus Hirsch in their E-Flux architecture volume *Sick Architecture*. See: https://www.e-flux.com/architecture/sick- architecture/.

Most of what has been produced on the skin of architecture has aligned with a recurring attention to a sense of 'cleanliness' and aesthetic pleasure derived from architectural spatiality, which has cultural connotations regarding what has been thus produced as 'clean' and appealing. Similar to how Kristeva unfolds abjection as a threat to the coherence of the socio-political normative body, Mary Douglas argues that our beliefs about dirt are fundamentally about order; they imply a systematic classification of matter. Unruly bodies such as microbes have to be evicted to form bodily integrity.[18]

Instead, based on empirical examples provided in this essay, we explore the architectural organic skin through a new lens using new methods; we turn toward the nonhuman deposits on architectural surfaces in a way that emphasises that nonhuman bodies are vital for the environment and thus human health. In method and output, the project *Epidermitecture* seeks to support and engage existing modes of coexistence between nonhumans, architecture, and the environment while employing a range of performative, arts-based, and collaborative research techniques to question how we think of surfaces today. *Epidermitecture* is a phenomenon of revived environmental aesthetics, a collective practice, that takes place within already occurring coexistence interactions. Hence, the challenge for *Epidermitecture* becomes not only how to represent a shifting environment, but also how to collectively practise it *as aesthetics* in order to re-imagine an architecture in which humans and nonhumans are brought closer together.

Fig. 8.01. Epidermitecture ©Adam Hudec

[18] Mary Douglas, *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (London: Routledge, 1966).

During your next walk in the city, start to notice stains on architectural organic skin: What shape are they? What is their colour? Where are they located? Come closer to architectural organic skin and try to touch and smell biopatina stains: What do they smell like? Are they soft or rather hard to touch?

Once you recognise the colour, shapes, smells, and tactile experience, try to find biopatina in the building where you live. Search around windows, doors, or water drains. Synergies of microorganisms forming biopatina do not require special treatment, artificial watering, fertiliser, or even our attention. They deserve only our acceptance. Next time you perform a regular chore of cleaning, remember to skip places where biopatina flourishes and tell your family and friends about the new knowledge about the environment you have just learned. By focusing—deeply—on the surface, we can find a way to support biopatina growth on architectural organic skins, and by doing that, move one step further toward an architecture of coexistence.

This essay is a result of the co-writing collaboration between art historian/curator Beatrice Zaidenberg and architect/researcher Adam Hudec. The research methodology and visual documentary is a part of an ongoing research project called *Epidermitecture* at the Academy of Fine Arts in Vienna, led by the professor of architecture Michelle Howard and professor of geomicrobiology Katja Sterflinger from the same academy.

“This essay, as mine, deals with the relation between surfaces and concerns of maintenance and cleanliness. The exploration is of the unruly wilderness that goes against the human need for control and aesthetic ideals of clearing. The text offers an alternative against systems that alter earth, to instead ‘search for solutions in the environment’.”

- Andreas Ervik, author of “A Small Old Plot,” *Metode* (2023), vol. 1 Deep Surface

“The work proposes that we can understand human-made surfaces as environments potentially rich in complex interwoven and interdependent elements that activate, work through, and affect each other.”

- Jenny Perlin, author of “Subterra Castle,” *Metode* (2023), vol. 1 Deep Surface

“Every membrane that is perceptible to humans has unintended indentations, bulges, dents, abrasions, scratches, etc., even if they can neither be seen nor felt.”

- Sybille Krämer, author of “The Cultural Technique of Flattening,” *Metode* (2023), vol. 1 Deep Surface

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