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# Photography and the Organic Nonhuman: Photographic Art with Light, Chlorophyll, Yeasts, and Bacteria

Jane Vuorinen\*

Recent writings on photography and the non-human have been centered on technological advances and the hardware and software used in digital photography, surveillance, photographic data and metadata, and the networked photographic image.<sup>1</sup> Less attention has been given to the organic nonhuman materials, agents, and processes used in photographic work.<sup>2</sup> In a wider contemporary context, the entanglements of human and nonhuman agents have been a main interest, especially to researchers with a new materialist and/or posthuman approach.<sup>3</sup> The present article contributes to this growing field.

This study focuses on works by three contemporary Finnish artists who incorporate organic materials and processes into photography. Jenni Eskola (b. 1982, Finland) produces images with chlorophyll and plant pigments by grinding them into a paste, spreading it on paper, and letting the papers fade in daylight. In Johanna Rotko's (b. 1976, Finland) works, which she calls yeastograms, images are formed on a yeast culture in a petri dish, which is exposed to UV light

through a stencil containing a photographic image. The UV light kills part of the yeast culture, and the remaining culture then takes the form of the image in the photograph stencil. Noora Sandgren (b. 1977, Finland) utilizes compost to produce works in which expired photographic paper is half-buried in compost soil, exposed to its bacteria, humidity, and warmth.

The writing of this article started in the midst of the Covid-19 pandemic, which in itself provides an apt background for reconsidering our relations with nonhuman species. My choice of these three artists was based not only on interest in their work but also on locality. I wanted to be able to meet them and engage in a continuous dialogue with them. All three had exhibitions in Helsinki during the time of planning and writing this article, and because of the temporal and processual quality of the work, I wanted to be able to visit those exhibitions several times.

All three artists work in the spaces between photographic art and bioart in their own ways. Artist Eduardo Kac defines bioart

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through three criteria, of which one or more can be employed: “(1) the coaching of biomaterials into specific inert shapes or behaviors; (2) the unusual or subversive use of biotech tools and processes; (3) the invention or transformation of living organisms with or without social or environmental integration.”<sup>4</sup> How the concept of bioart is tightly entangled with technology is obvious in Kac’s categorization. The aims of this article are to renegotiate the conceptual borders between photography, bioart, and science and to dismantle the dichotomy between the concepts of technological and organic in the context of contemporary photographic art. How does the life of the materials affect the production and interpretation of the images? Can there be such a thing as an organic image? In what ways do artistic and scientific methods meet in these works? The methods of bioart are deeply entangled with those of the natural sciences; however, they operate within a more subtle conceptual field, where beauty and aesthetics also come into play. Furthermore, bioart is profoundly enmeshed with artistic research, and much of the theoretical literature referred to in the present article has been written by artists, which gives a closer look to the embodiment of theory in practice and deepens the understanding of the artworks analyzed.<sup>5</sup>

The present article contributes to plant studies as an emerging academic field by analyzing the agencies of nonhuman, nonanimal others: chlorophyll, yeasts, and bacteria. If animals have been marginalized in Western thought, then “non-human, non-animal living beings, such as plants, have populated the margin of the margin, the zone of absolute obscurity undetectable on the radars of our conceptualities,” as philosopher Michael Marder observes.<sup>6</sup> Analyzing the agencies of

microbial life probes into this margin of the margin inhabited by nonhuman, nonanimal others. By bringing together new materialist and posthuman thought<sup>7</sup> with photography history and theory<sup>8</sup> and by engaging in dialogues with the artists, an approach that appreciates the multiple agencies at work – human and nonhuman – becomes established.

Since the 1990s, a new theoretical interest in the material qualities and cultures of photographs, in addition to the information or visual content they carry,<sup>9</sup> coincides with a broader eco-critical movement in the environmental debate.<sup>10</sup> We are at a point in history where questions of materials and materiality have become nothing less than pivotal to the survival of our species – and many other species besides. Sustainability and ethical considerations of interspecies relations are vital not only in art<sup>11</sup> but also in a wider context. An underlying eco-critical stance is what gives the works analyzed not only a forceful affective impact but also an urgency. They call us to consider and reconsider our relationship with our surroundings, both physical and philosophical, and the other beings inhabiting them.

### **Delicate color variations**

Jenni Eskola produces artworks with chlorophyll and plant pigments by spreading the plant-derived “paint” on paper and leaving it to gradually fade in daylight. This fading process continues as the works are exhibited in their different stages, often as a series that shows the gradual progression of the fading.

In the series *Evergreen* (2015 – ) (Fig. 1), the painted area fills the whole frame of the works, comprising a color field of green turning to brown and yellow and in the end



**Fig 1.** Jenni Eskola, *From the series Evergreen (2015 – )*. Installation view from exhibition *With Time*, Helsinki Art Museum 18.11.2017–4.1.2018. Photo: Maija Toivanen/HAM.

fading almost completely. The absence of a singular image motif accentuates the importance of materials. The name of the series playfully makes clear not only the impossibility of the physical permanence of artworks but also their conceptual power to immortalize a subject by preserving the subject's likeness as an image.

For the series *Color Study (On Permanence)* (2021) (Fig. 2), Eskola produced pigments with 39 different flowers,<sup>12</sup> painted two color fields on paper with each, and then exposed the other to daylight and shielded the other from it. The results of this process are framed so that each frame contains two rectangular surfaces, the exposed one on top and the protected one below, making visible the reaction of each different flower pigment to daylight. The color surfaces bring to mind

abstract art, and the method is reminiscent of a time before industrialization when artists would have to prepare their own paints and pigments from ingredients derived from nature. Identifying and naming the flowers turns the work into a herbarium, but instead of classifying the visual features of the flowers as plants and their morphology, the series brings out the processual fading of their colors. Using their taxonomical or common names makes the plants representative of their species rather than single individual plants.

Eskola creates her large works usually by using a paint roller, while in the smaller ones she utilizes a paintbrush. The green plant paint in the series *Evergreen* comes from plant juice, which Eskola extracts by using a juice press. In fact, her fascination



**Fig 2.** Jenni Eskola, *From the series Color Study (On Permanence) (2021)*. Installation view from exhibition Antti Oikarinen & Jenni Eskola: *VÄLISSÄ*, Forum Box Helsinki, 15.10–7.11.2021. Photo: Anna Autio/Forum Box.

with chlorophyll as the paint started from preparing wheat juice to drink. In the series *Color Study*, Eskola used flowers from her own garden and surroundings, both local wildflowers and garden flowers, in which the intensity of the colors and their permanence varied greatly.<sup>13</sup>

Eskola's works are luminograms, a special type of photography similar to photograms, but made using only light and light-sensitive material, without an object placed on the surface to form an image. One could even ask whether they are images in the first place, as there is no figurative subject. The color variations of the nonfixed plant substance bring to mind the days of early photography,<sup>14</sup> when it was already possible to make photographic images, but a way to fix them was not yet found, and the images

would fade away. Furthermore, Eskola's works are anotypes, photographic images made using plant-based materials.<sup>15</sup> Many natural substances are sensitive to light, and the use of organic materials in photography has a long history. Knowledge related to this is especially important in the preservation and conservation of historical photographic prints.<sup>16</sup>

The changing of colors in nature signals the changing of the seasons. The timeframe for Eskola's works comes borrowed from the life of the plants, from seasonal changes. Artists Heather Ackroyd and Dan Harvey, who have also used chlorophyll to produce artworks, write about senescence, leaf death,<sup>17</sup> which is the phenomenon at the center of Eskola's works. Senescence is a survival method through which a plant can kill parts

of itself in order to preserve its core functions in a hostile environment. "The disappearance of green color is the visible sign of a plant under stress," Ackroyd and Harvey write.<sup>18</sup> The seasons determine the possibilities of working with plants. Eskola most often works with fresh plants and flowers, and as winters in Finland are long, the short time when flowers bloom needs to be seized.

The time span of the changing colors becomes dependable to that of exhibition schedules as the works fade according to their time being exposed and exhibited. Their seasons are thus related to the progress of the year and the natural fluctuation of light in an environmental sense, and the changes that take place in the works also become entangled with their appearances in exhibitions. Their continuing and volatile processuality thus makes exposure visible in another sense: the works that are exhibited the most and for the longest times fade faster. Whether the work is still the same as it keeps on changing is a question that Eskola has been occupied with. When can a work be considered ready or finished? Is it when the color has completely faded and does not change anymore, or is the work already destroyed at that time? Does the image still exist when the color has faded away?<sup>19</sup> Their inherent ephemerality makes the works temporal and situates them also in relation to the field of time-based art, although their temporality does not have a specific or fixed duration, but rather a continuity.

The way light causes Eskola's works to fade and age makes them skin-like, life-like, rendering visible the fragility of both the pigment and the paper. The conservation of traditional analog/chemical photographs is based on the properties of different kinds of

papers, as it is with graphic art and drawings. Marder emphasizes the fragile balance between light and darkness and how both are needed for a plant to thrive.<sup>20</sup> The same is true for analog photography. Due to too much light, the image fades or burns away, and due to too much darkness, it does not come into being. Light, the thing that brings a photograph into existence, can also destroy it.<sup>21</sup> The underlying paper becomes more visible after the color fades away; the paper itself changes by the passing pigment and exposure to light. Thus, the paper is not an unaffected carrier medium for a photographic image, but its own aging in the process becomes visible.

Eskola has been trained as a painter, and she does not primarily identify with photography or bioart.<sup>22</sup> What connects Eskola's works with bioart and photography, however, is light-sensitive biomaterials and experimentality. In her work, the surprising outcomes of these experiments are more important than a hypothesis or a pre-planned workflow.

In Eskola's work, it is not so much about single images but seriality, the progression of all the works simultaneously and at a different pace. Flowers and plants as archetypal motifs in art become apparitional vestiges in Eskola's work; they are present as material, but not so much as individual visual subjects. The color fields divided into two remind us of Mark Rothko's and Piet Mondrian's color field paintings, but because they contain the essence of their origin, the plants, they are also pure presence. They are not only abstract in a non-figurative way; instead, their conceptuality is deeply rooted in their very materiality. They carry with them the lives of their subjects. This connection of the plant materials to their origin is why working sustainably is important to Eskola, and she is

careful, for example, not to harvest too many flowers from one site, always leaving some for the pollinators.<sup>23</sup>

Residing between nature and art, Eskola's works bypass the question of mimesis. Rather than images, they are performative processual artworks, which bring forth a process that could be called photopoiesis, images formed through and with light. The nonhuman time of the plants is unmeasured, durational, and continuing, as the works extend photographic temporality from a fast shutter-click moment to an ongoing unfolding.

### Life forms

In Johanna Rotko's yeastograms, images are made of preexisting photographs by exposing a yeast culture in a petri dish to UV light (Figs. 3 and 4). Rotko has been working with this method since 2014.<sup>24</sup> The photographs are computer-worked and printed as

raster images on film, such that is used with overhead projectors. The image on the film needs to have high contrast in order to become well formed through the yeast. UV light kills the part of the yeast culture that is exposed to it, as the photograph stencil protects other parts of the culture. After the exposure period of approximately 48 h, the petri dishes are taken out of the UV light, and the remaining yeast will start to grow following the shape of the image. This growth is then photographed by Rotko to document its stages, as the living yeast itself cannot be fixed into a stable image. Eventually, the yeast image in the petri dish will become unrecognizable as the culture itself develops into more elaborate forms and as other species such as molds start to develop in the dish. This growth is unpredictable, and some dishes develop more rapidly than others.<sup>25</sup> As in Eskola's works, so in Rotko's, the uncontrollable colors and shapes of the yeast and molds resemble those of abstract art.



**Fig 3.** Johanna Rotko, *Woman on Charcoal* (2022). Species cultivated: BE-134 yeast (*Saccharomyces cerevisiae*). Growth medium: Charcoal. Exposure dates: 24. – 26.01.2022. Photographed 21.2.2022.



**Fig 4.** Johanna Rotko, *Woman on Charcoal* (2022). Species cultivated: BE-134 yeast (*Saccharomyces cerevisiae*). Growth medium: Charcoal. Exposure dates: 24. – 26.01.2022. Photographed 5.4.2022.

The molds often grow around a central point, creating circular forms, as in *Woman on Charcoal* (2022) (Fig. 4).

The same work advances through different stages, starting out as fresh and developing into containing different types of life forms that function as parts of the image. As the object takes on new forms, the image also grows to contain new colors and forms. To document the development process, Rotko takes photographs of the yeastograms, which she then often exhibits alongside the developing cultures in the petri dishes. The documentation of growth is a documentation of life, as the yeastogram is alive in a literal sense. This act of photographing the process is similar to fixing a photographic image in the darkroom with chemicals, stopping the process at the optimal moment of the photograph's development.

The glistening white yeast and the slightly reflective darker background cause the fresh yeastograms to visually resemble daguerreotypes, which have highly reflective, almost mirror-like surfaces. As Rotko's works continue to develop, their freshness is replaced by advancing growths of the yeast and of molds and bacteria. Ripeness is a moment that passes, and the yeastograms become "overripe" as the image starts to deteriorate. This situates the works in relation to the tradition of the still life, where the depiction of decaying fruits and flowers has been a way to symbolize the fleetingness of time. They are an active and ongoing memento mori. This combination of action and process with the theme of the still life creates a sustained tension – an extended and recorded process of decay instead of a single suspended moment in time.<sup>26</sup> In Rotko's yeastograms, this process can either be experienced during an exhibition through multiple visits

or via photographic documentation recording the passage of time.

The growths on the surface of the yeastograms take on a three-dimensional form, creating rhizomes and layers, a micro-spatiality on the surface, which is difficult to see with the naked eye but possible to observe and document through photography with macro lenses. This brings to play the scientific gaze as the growths are observed and documented through optical instruments. From an institutional and curatorial point of view, the photographs also make the yeastograms more accessible and amenable to control.

In the exhibition *Living Images* at Bioart Society's Solu Art Space in Helsinki,<sup>27</sup> Rotko included ongoing yeastograms in petri dishes as installations with the documentary photographic images, as well as close-up photographs of the growth's intricate colors and shapes. In conjunction with the exhibition, the artist led a workshop for exploring the method, in which I had the pleasure of taking part.<sup>28</sup> The workshop was a communal experience, with the participants experimenting together with the artist through trial and error. During the workshop, we did everything from scratch, starting with the preparation of the petri dishes with a colored agar base. Agar is a gelatinous substance made from seaweeds, used as a medium in biological cultures.<sup>29</sup> The agar itself is colorless, so natural ingredients such as charcoal, turmeric, or blueberries were added as a dye to function as a background color for the yeast. The dry yeast powder was then mixed with water to create a liquid solution to coat the agar base, followed by preparing the raster stencil images attached to the lids of the petri dishes. The petri dishes with the agar, the yeast, and the photographic image stencil on top were then set under UV

lamps for a duration of 48 h for the yeast images to start to form. There were some crucial stages to the process that one might not come to think about by only looking at the final images, such as boiling the water used in the process to minimize the presence of organic growth other than yeast, like bacteria, or making the yeast-liquid coating have just the right thickness, or choosing photographic images with enough contrast and sharpness to produce a clear image.

The image in the yeastograms is formed by the yeast not exposed to UV light. Whereas Eskola lets nature take its own course with the daylight slowly fading the chlorophyll and exposing the works to light over a long period of time, Rotko conducts a more active exposure to light by using UV lamps to kill parts of the yeast culture to produce the images.

Art theorist and curator Gunalan Nadarajan writes of ornamental life forms, which “have been historically created by selective breeding of varieties to cultivate qualities that have appealed to us for some aesthetic dispositions and values [...]”<sup>30</sup> They are to be separated from life forms bred for instrumental purposes, such as food or labor.<sup>31</sup> Rotko utilizes yeasts used in baking and brewing beer, which raises an ethical question: are her works to be likened to baking and brewing or are they to be considered ornamental as in Nadarajan’s description? The answer depends on whether we think art has an instrumental purpose, as food and labor do.

Another realm where life forms are used for instrumental purposes is science, and using animals and other living beings as instruments of research is a fundamental ethical question in the natural sciences. Concerning bioart, the parameters change slightly. Even

if the other instruments used, such as laboratories and petri dishes, remain the same, when the ends change, so do the ethical issues. Beauty can also be a desired goal or purpose in bioart,<sup>32</sup> which radically separates it from the sciences, and makes the underlying ethical questions more nuanced. Whether it is right to kill a research animal is a question Rotko has reflected on in her thesis.<sup>33</sup> Furthermore, she writes of the ever-present difficulty of combining the roles of the artist and the researcher in bioart<sup>34</sup> and being constantly aware of the problem of the research being verifiable and repeatable.<sup>35</sup>

### Images from the compost

Noora Sandgren takes expired photographic paper and buries it in compost to produce images. The natural processes of the compost, like growing bacteria and molds, start to create visual effects on the paper, which is sensitive not only to light but also to changes in temperature, moisture, and chemical processes. In a darkroom, the chemical processing of an image is controlled through different phases, whereas in Sandgren’s work, the stage is left open for the compost to do its work.

In the exhibition *New Perspectives Through Photography – 25 Years of the Helsinki School*,<sup>36</sup> Sandgren installed a glass box with the compost soil, including the photographic papers in *Images – seeds, planting and harvesting* (11.9–31.10.2021) (Fig. 5), along with photographic prints of the results of the compost process, in *Henko – Correspondence (compost 7 days)* (2020) (Fig. 6). In the installed compost box, there were fruit flies, centipedes, and little sprouts of plants to be seen among the soil and the photographic papers inserted in the midst. Sandgren has



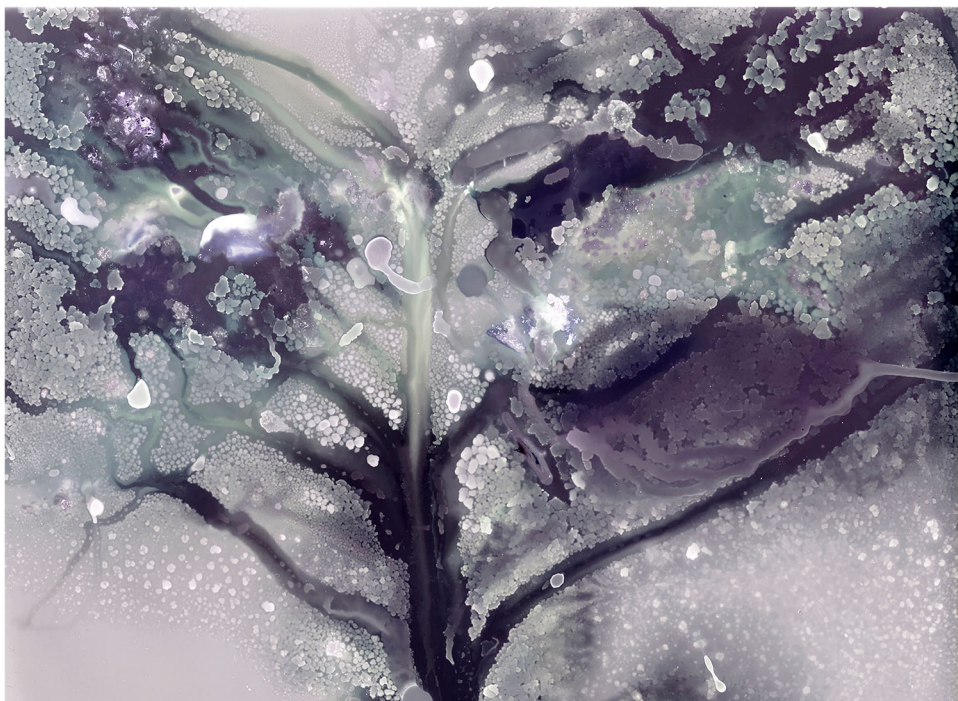
**Fig 5. Noora Sandgren, *Images – seeds, planting and harvesting* (11.9–31.10.2021). Durational living installation. Glass, 2-year-old compost material, various B&W outdated photosensitive papers, list of microbial agents, fungi & bacteria of the soil gathered through DNA sequencing of a sample from compost at Hiidenvesi garden site in May 2021.**

worked with scientists<sup>37</sup> to be able to identify and name the bacteria and fungi at work in making the image and to credit them in the nameplate of the work.<sup>38</sup> The glass box enclosing the compost soil in a museum space functions as a vitrine and presents the living (*in vivo*) compost observable as a specimen (*in vitro*).

The papers can spend a while in the compost, days or weeks. As with Eskola's color variations and Rotko's yeastograms, the timeline is not fixed or the same for different works. After this phase, Sandgren either lets the papers evolve or scans them for further development. This is where the artist makes choices in what levels of participation in the image creation one exercises, for

example, what to emphasize in the visual results. Still, the visual can only transmit some of the qualities of the compost images since each paper has its characteristic smell, feel, and life. Working with the image is a slow process, and Sandgren describes this phase as similar to getting to know a new person, listening, asking questions, and making observations.<sup>39</sup>

Sandgren regards photographic papers not as instruments but as partners, and there is an ongoing flow between letting the images develop by themselves and taking part in the development by emphasizing some qualities of the image. She notices the different qualities of the laboratory and the garden as working spaces; the former is a more control



**Fig 6.** Noora Sandgren, *Henko – Correspondence (compost 7 days)* (2020).

oriented, orderly choreographed minimalist space, and the latter is more collaboration oriented, multi-agential, unruly, and less predictable.<sup>40</sup> The work happening under the soil remains unseen.

The chthonic is often associated with death; it is a dangerous underworld where living beings should not enter. The earth is where the dead are buried, out of sight, in darkness. Photography has also been associated with death from the beginning, and early photographs were often described as ghostly or eerie apparitions and lingering presences.<sup>41</sup> This is fitting, as a ghost is something that has a visual presence, but no material being; it is ephemeral and spectral, something that can be seen but not touched.

The compost, however, is brimming with life, and for feminist theorist Donna Haraway, the concept of compost serves as a theoretical tool instead of posthuman(ism).<sup>42</sup> She calls our time the Chthulucene, a combination of the Greek words *khthôn* and *kainos*.<sup>43</sup> “Kainos means now, a time of beginnings, a time for ongoing, for freshness,” she writes, whereas “Chthonic ones are beings of the earth, both ancient and up-to-the-minute.”<sup>44</sup> Haraway’s thinking has been an influence in Sandgren’s work, where the artistic practice is accompanied by writing.<sup>45</sup> In Sandgren’s own view, the artist also works similarly to compost: accumulating material and living with it, processing it, and letting new things develop through this method.<sup>46</sup> This resonates with Haraway’s suggestion of

the compost as an alternative for posthumanist thinking, a being-with in the present, rather than only after something. Haraway uses the word sympoiesis to describe “making-with”: “Sympoiesis is a word proper to complex, dynamic, responsive, situated, historical systems. It is a word for worlding-with, in company. Sympoiesis enfolds autopoiesis and generatively unfurls and extends it.”<sup>47</sup> The compost is not a way to discard and get rid of, but an afterlife, generative and nourishing.

The vegetal world takes nourishment from dead things and repurposes it into energy, creating a mediation and passage between the living and the dead. Marder calls this “a non-mystified and material ‘resurrection’, an opportunity for mortal remains to break free from the darkness of the earth.”<sup>48</sup> The compost generates both warmth and moisture, the basic requirements for life, and contains nutrients for living organisms to consume. The compost, however, is dark; there is no light under the surface of the soil. In Sandgren’s work, this brings to mind the darkroom. For an analog photograph to be developed, there needs to be a balance between light and darkness. There is fertile darkness both in the soil and in the darkroom.

### Cameraless photography

The works of Eskola, Rotko, and Sandgren can all be considered cameraless photographs, although in Rotko’s work the starting point of which the stencil is made is usually a photograph taken with a camera. Cameraless images have had a marginal part in the histories of photography, as photography historian Geoffrey Batchen points out.<sup>49</sup> According to Batchen, histories of photography have been mainly written following the lines of

technological advances, favoring photographs made with a camera. The starting point of such histories has often been the technological invention of the camera obscura, whereas cameraless photographs have been treated like “second-class citizens in such histories.”<sup>50</sup>

Batchen characterizes cameraless photographs as photography’s self-portraits.<sup>51</sup> But whereas botanical specimens, flowers, leaves, and algae were often subjects in early experiments with cameraless photography,<sup>52</sup> Eskola takes one step further and grinds the plant specimens into the very material to work with. She does not capture the outlines of plants on light-sensitive paper but produces light-sensitive paper with the plants themselves. Rotko in turn employs yeasts, molds, and bacteria to create her yeastograms, and Sandgren likewise leaves the work for bacteria and the humidity and warmth of the compost soil. These processes result in acheiropoietic images, which are not only *of something*, but that *are something* in themselves. They are not the absent subject made present by way of a figurative likeness, but the actual presence of that subject, in its ever-changing, ever-evolving temporal ongoing. The organic is not only the visual subject of the images but also their materially creative agent. The works can be seen as photography’s self-portraits, as Batchen describes cameraless photographs, but if we take a broader look and regard the material actants as well, the nonhuman organic agents, then Haraway’s abovementioned concept of sympoiesis becomes more suitable than mere autopoiesis, as the images are created together, with company.

At different stages, the artists all leave their works to develop on their own. This seemingly passive process of development can be seen as analogous with the growth of plants, with what Marder calls “non-

conscious intentionality”: “Instead of pursuing a single target, non-intentional consciousness uncontrollably splits and spills out of itself, tending in various directions at once, but always excessively striving towards the other.”<sup>53</sup> This non-teleological migration or growth Marder describes as “itinerant beauty,”<sup>54</sup> which also fits to describe the growths of bacteria and molds in Sandgren’s and Rotko’s works, as they trace the migration and temporal advancement of these organic nonhuman others – their life – becoming a map and a trajectory of their journey. Receiving an image, rather than making one, was an idea that was central to early conceptualizations and writings on photography, which was later abandoned as the acceptance of photography as an individual art form required the emphasis of the role of the photographer as a creative agent.<sup>55</sup> The artists here rather take the role of a facilitator for these nonhuman processes to take place.

### The vibrancy of the living image

An image can be something fleeting, like a mirror image, a reflection, or a shadow, and the images on the retina are similar to those apparent in a camera obscura, changing, and non-fixed. A photograph, however, is considered to be a still image fixed on a material surface or viewable through a screen, and fixity and stability have been accepted as characteristic in contemporary views of what photography is.<sup>56</sup>

Art historian Kate Palmer Albers reminds us that early photography was more marked by ephemerality than fixity.<sup>57</sup> She notices the challenge ephemeral photographs pose for conventional tools of art history, which privilege tangible, reviewable objects,<sup>58</sup> and argues that for this reason, transience has been

overlooked in histories of photography, even suppressed.<sup>59</sup> A case in point is how perhaps the most known early photograph, Niépce’s view from his studio window (1827), is known through a heavily retouched copy, as the original image is very faint and scarcely viewable.<sup>60</sup> Another example of photography’s history being a history of images rather than a history of objects<sup>61</sup> is how the original of Daguerre’s *Intérieure d’un cabinet de curiosités* (1837) has survived only through reproductions, and the original plate containing the original image has all but faded to only a mirror surface.<sup>62</sup> Ephemerality is a characteristic at the center of Eskola’s, Rotko’s, and Sandgren’s works.

Rotko and Sandgren use photography and scanning as documentation methods, which accentuates the performative qualities of the organic processes. This optical observation links the workings of the microbes to the optical unconscious, a term used by Walter Benjamin to describe the optical world as yet undiscovered by the human gaze before the invention of photography and photography’s ability to visually capture phenomena outside the human sensorium.<sup>63</sup> Photography thus not only documents but also makes visible beings and activities not otherwise visible to the naked (human) eye. Without photographing by Rotko and scanning by Sandgren, the microbial workings would remain unnoticed, hidden outside the field of human vision. In Rotko’s case, the works’ visibility is also expanded through the artist’s Instagram account, where she shares images of the yeastograms in various phases, also after their image content has become unrecognizable when the yeast and bacteria on the surface have taken over.<sup>64</sup> Two kinds of duration are present here: the slow processual duration of the works and the extended

duration achieved through the documentation, which produces the more “tangible, reviewable objects for conventional tools of art history,” which Palmer Albers noted above. The ephemerality of Eskola’s works in turn is emphasized by her habit of *not documenting* the progression of her works, but simply letting them fade.

The artworks analyzed here are unfixed as they continue to develop and change. Therefore, the viewer always sees only one phase of a process when encountering works in an exhibition. The slow processuality and durational temporality<sup>65</sup> of the works can become visible in an exhibition through multiple visits, much like visiting a garden. Marder observes that for us to be able to notice the growth of a plant, there needs to be a break or a rupture in our temporal approach to it, like coming back home after a period of absence.<sup>66</sup> Seen in one moment, a plant appears immobile, and its relatively slow changes become apparent through non-continuous, repeated observation. In Sandgren’s compost installation,<sup>67</sup> for example, this effect became quite literal, as the vegetal sprouts in the compost were small in the early days of the exhibition and grew taller and more noticeable toward its end. Depending on the light conditions of the exhibition space, Eskola’s works can noticeably fade even during one exhibition,<sup>68</sup> and through extended observation, the changes appearing in Rotko’s yeastograms become visible.

The ability of today’s technology to observe, record, fix, preserve, and control can easily be taken for granted. The material fleetingness that was apparent in early photography has all but been eliminated nowadays, as photographic processes have become more and more controlled. In the works of these artists, ephemerality becomes

central once more. The fading colors in Eskola’s works as they are exhibited time and time again, the optimal moment of the image in Rotko’s yeastograms before they pass their moment of ripeness and start to become unrecognizable, and the repurposing of already expired photographic papers by Sandgren all speak of seizing a moment, but also of letting it pass. The timeline of these works extends beyond what they are able to record. They do not so much preserve as make visible and tangible the passing of time. In analyzing such living images, concepts such as freshness and ripeness then become pertinent. The photographic in these works becomes a moment that passes.

### **Conclusion: between photography, bioart, and science**

Artistic research is common to all three artists, and they are rather working *with* their materials and instruments than using them for observing and measuring. While in Rotko’s yeastograms the process using the instruments of biology is somewhat controlled, Eskola and Sandgren rather take a de-instrumentalizing approach. By reducing the intentionality and teleology of the process, a space is opened up for receiving. Weakening the agency of the artist could be seen as analogous to the philosophical concept of weak thought.<sup>69</sup> By taking a step back, the artists are weakening and dismantling the power of ontological systems and structures inherent in both research and art. Art’s processes as an institution become visible in Eskola’s works, as they become consumed by their exposure, Rotko in turn works with the tools of biology and chemistry in a subversive way, and Sandgren questions the

controllability of photography as a way of making images by using expired papers.

Using the Latin names of plants and bacteria designates Western scientific tradition, taxonomizing, and control. Sandgren underscores accessibility issues with bioart: access to laboratories and experts, access through scientific language, and access to safe working conditions. DIY/DIWO<sup>70</sup> has its own culture and possibilities, but there are also risks when working with poisonous or harmful materials, as opposed to working in well-equipped laboratory conditions with protocols and specialist support.<sup>71</sup> The works of all three artists oscillate between control and receiving.

As the organic materials and agents that produce the images are alive, they can be thought of as hosts for the images. There is not only a liveliness but concrete life in the materials, and with life, there always comes death, the senescence of the plants in Eskola's work, the elimination of yeast cultures with UV light in Rotko's, and the decaying materials of the compost in Sandgren's. This opens up a space for ethical considerations in relations between human and non-human agents in art, a field where much further research is needed.<sup>72</sup>

Sustainability is an important starting point for all three artists, and what their works underscore is the need to bring into discussion the materials and processes of contemporary photographic art. Not only is it important to discuss art's materials from an analytical point of view to extend the interpretative horizons of the works, but it is also crucial to start to pay attention to the sustainability of photographic materials. The material a photographic image is viewable through can no longer be thought of as only a base or support for a photographic

image,<sup>73</sup> but it must be regarded as an integral part of the meaning-making of the works, including the accompanying ethical questions. Finding a way to work with the problems of material, or as Haraway so eloquently puts it, "staying with the trouble,"<sup>74</sup> is both a methodological and a philosophical question and challenge.

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## Notes

1. See, e.g. Joanna Zylińska, *Nonhuman Photography*, Cambridge, MA: MIT Press, 2017.
2. For illuminating accounts on the interstice of photographic art and organic nonhuman processes and agents, see Heather Ackroyd & Dan Harvey, "Chlorophyll Apparitions", in *Signs of Life. Bio Art and Beyond*. ed. Eduardo Kac, Cambridge & London: MIT Press, 2007, pp. 199–210; Edgar Lissel, "The Return of Images: Photographic Inquiries into the Interaction of Light", *Leonardo* 41, no. 5 (2008): pp. 438–449. <http://www.jstor.org/stable/20206660>; Johanna Rotko, *Vanishing Images. Yeastograms and Other Agar Plates – Experimental Artistic Research Report*, Master's thesis, Aalto University, Helsinki, 2015. <http://urn.fi/URN:NBN:fi:aalto-201603291490>; Johanna Rotko, "Living Images, Yeastograms", in *Art as We Don't Know It*. eds. Erich Berger, Kasper Mäki-Reinikka, Kira O'Reilly, & Helena Sederholm, Tallinn: Bioart Society & Aalto University, 2020, pp. 106–107; Noora Sandgren, "Kanssaoloista", in *Jälkikirjoituksia valokuvasta*. ed. Hanna Weselius, Helsinki: Kustantamo S&S, 2022, pp. 136–167.
3. See Donna J. Haraway, *Staying with the Trouble. Making Kin in the Chthulucene*. North Carolina: Duke University Press, 2016; Marietta Radomska & Cecilia Åsberg, "Doing Away With Life: On Biophilosophy, the Non/Living, Toxic Embodiment, and Reimagining Ethics", in *Art as We Don't Know It*. eds. Erich Berger, Kasper Mäki-Reinikka, Kira O'Reilly, & Helena Sederholm, Tallinn: Bioart Society & Aalto University, 2020, pp. 54–63; and also Rotko, 2015; Sandgren, 2022.
4. Eduardo Kac, "Introduction. Art That Looks You in the Eye: Hybrids, Clones, Mutants, Synthetics, and Transgenics", in *Signs of Life. Bio Art and Beyond*. ed. Eduardo Kac, Cambridge & London: MIT Press, 2007,

- pp. 1–27, p. 18. Other terms used for such art have been biotech art, life-art, genetic art, and transgenic art (Robert Mitchell, *Bioart and the Vitality of Media*, Seattle: University of Washington Press, 2010. <http://www.jstor.org/stable/j.ctvcwnfnr>, p. 3); however, bioart has perhaps become the most established term, sometimes written 'bio art' or 'bio-art'.
5. Kac, 2007; Ackroyd & Harvey, 2007; Lissel, 2008; Patrícia Noronha, "Yeast Biopaintings: Biofilms as an Artistic Instrument", *Leonardo* 44, no. 1 (2011), pp. 38–46. <https://www.jstor.org/stable/20869386>; Rotko, 2015; Rotko, 2020; Sandgren, 2022. Artistic research has a long tradition, especially in Finland, and Rotko and Sandgren are active members of the Finnish Bioart Society; see <https://bioartsociety.fi/about>
  6. Michael Marder, *Plant-Thinking. A Philosophy of Vegetal Life*, New York: Columbia University Press, 2013, p. 2.
  7. Haraway, 2016; Marder, 2013.
  8. Walter Benjamin, "Little History of Photography", in *The Work of Art in the Age of Its Technological Reproducibility and Other Writings on Media*. eds. Michael W. Jennings, Brigid Doherty, & Thomas Y. Levin. Translated by Edmund Jephcott, Rodney Livingstone, Howard Ellans et al., Cambridge, MA: Harvard University Press, 2008 [1931], pp. 274–298; Geoffrey Batchen, *Burning with Desire. The Conception of Photography*, Cambridge: MIT Press, 1997; Geoffrey Batchen, *Each Wild Idea. Writing Photography History*, Cambridge & London: MIT Press, 2002; Kaja Silverman, *The Miracle of Analogy, or, the History of Photography. Part 1*, Stanford, California: Stanford University Press, 2015; Geoffrey Batchen, *Emanations. The Art of the Cameraless Photograph*, Munich: DelMonico Books, 2016; Zylinska, 2017; Kate Palmer Albers, *The Night Albums. Visibility and the Ephemeral Photograph*, Oakland, California: University of California Press, 2021.
  9. See Costanza Caraffa, "Photographic Itineraries in Time and Space", in *The Handbook of Photography Studies* (1st ed.). ed. G. Pasternak. London, UK; New York, NY, USA: Bloomsbury Visual Arts, 2020, pp. 79–96.
  10. See Serenella Iovino, Serpil Oppermann, David Abram, Joni Adamson, Jane Bennett, Eli Clare, Stacy Alaimo, Hannes Bergthaller, Jeffrey J. Cohen, & Simon Estok, *Material Ecocriticism*, Bloomington: Indiana University Press, 2014.
  11. Interspecies art is another emerging field and categorization, which classifies the works of Eskola, Rotko, and Sandgren.
  12. "Impatiens walleriana, dahlia, gladiolus, spreading bellflower, tufted vetch, hydrangea, macrantha, impatiens glandulifera, toadflax, bluebell, globeflower, ragged-robin, columbine, snapdragon, fireweed, woodland geranium, daffodil, buttercup, speedwell, water avens, pansy, geranium, petunia, peony, red clover, daisy, daylily, purple loosestrife, rapeseed, cornflower, rose, rose begonia, marigold, edging lobelia, dotted loosestrife, dame's violet, fuchsia and dandelion." (Exhibition text, Antti Oikarinen & Jenni Eskola: *VÄLISSÄ*, Forum Box Helsinki, 15.10–7.11.2021.)
  13. Interview with Eskola 14.12.2021.
  14. See Batchen, 1997 on the history of the conception of photography in the late eighteenth and early nineteenth centuries.
  15. There are several contemporary artists working with anthotypes at the moment. So much so that this could even be seen as a small movement. These artists include Almudena Romero, Nettie Edwards, Meggan Gould, Edd Carr, Melanie King, and Laura Kaker, to mention a few. See also <http://www.londonaltphoto.com/sustainable-darkroom-about>
  16. See J. M. Reilly, *Care and Identification of 19th Century Photographic Prints*, Rochester, NY: Eastman Kodak, 1986.
  17. Ackroyd & Harvey, 2007, p. 199.
  18. *Ibid.*, pp. 201–202.
  19. Interview with Eskola 14.12.2021.
  20. Marder, 2013, p. 30.
  21. See Batchen, 2002, p. 132 on Talbot's struggle with the fatality of light for image permanence; and Lissel, 2008, p. 444 on light as a medium of destruction.
  22. Interview with Eskola 14.12.2021.
  23. Interview with Eskola 14.12.2021.
  24. Rotko has learned the method from art group *Pavillon\_35* and developed it further (Rotko, 2020, p. 106). For other predecessors for Rotko's practice in the histories of art and science, see Lissel, 2008; and Noronha, 2011.
  25. See Rotko, 2015.
  26. Similar themes can be found in the video work depicting rotting fruits and flowers of Saara Ekström (b.1965, Finland) and Sam Taylor-Wood (b. 1967, England), respectively. I thank an anonymous reviewer for the suggestion of the latter.
  27. 13.8. – 13.9.2020. See <https://bioartsociety.fi/about>
  28. The duration of the workshop was three days, 25. – 27.8.2020.
  29. Using gelatin from beef stock for the base for cultures in petri dishes was the standard before agar. Gelatin is also used in photographic materials, both in films and in photographic papers. See Reilly, 1986.
  30. Gunalan Nadarajan, "Ornamental Biotechnology and Parergonal Aesthetics", in *Signs of Life. Bio Art and Beyond*. ed. Eduardo Kac, Cambridge & London: MIT Press, 2007, pp. 43–55. p. 49.
  31. *Ibid.*
  32. Rotko, 2015, p. 39.
  33. Rotko, 2015, p. 21.

34. *Ibid.*, pp. 26–27.
35. *Ibid.*, p. 39.
36. Kunsthalle Helsinki 11.9. – 31.10.2021.
37. With biologist Janka Mojzer and laboratory manager Victoria Kang, while in residence at Aalto University's Biofilia-laboratory in May 2021 (E-mail correspondence with Sandgren, August 2022). See <https://www.aalto.fi/en/departement-of-art/art-and-biopolitics>
38. Fungi: *Scutellinia sp. OTU101 AN-2016*; *Fusarium lichenicola*; *Paracremonium inatum*; *Apiotrichum scarabaeorum*; *Cephaliophora sp.*; *Penicillium commune*; *Pueraria montana*; *Tausonia pullulans*; *Arthrobotrys amerospora*; *Podospora pyriformis*; *Chaetomium strains*; *Chaetomium acropullum*; *Chaetomium tetrasporum*; *Gilmaniella macrospora*; *Mycothermus thermophilus*; *Torula herbarum*; *Torula sp. JZ-135*; *Trichocladium arxii*; *Trichocladium asperum*; *Trichocladium griseum*; *Trichocladium seminis-citrulli*; *Mortierella sp. JCM 28527*; *Humicola strains*; *Humicola fuscoatra*; *Mycothermus thermophilus*; *Trichocladium griseum*; *Fusarium*; *Ascobolus sp.*; *Trichosporonaceae*; *Trichoderma ghanense*; *Cyrtohymena citrina*; *Varicosporellopsis aquatilis*; *Fusarium merismoides*; *Fusicolla septimaniniscientiae*; *Nectria sp. ASIN2*; *Arthrographis kalrae*; *Humicola fuscoatra*.
- Bacteria: *Truepera radiovictrix*; *Methylobacillus rhizosphaerae*; *Candidatus Solibacter usitatus*; *Chryseolinea soli*; *Solitalea canadensis*; *Methylomicrobium kenyense*; *Bellilinea caldistulae*; *Tangfeifania diversioriginum*; *Arenibacter sp.*; *Owenweeksia strains*; *Azoarcus strains*; *Azoarcus communis*; *Hyphomonas sp. MOLA 55*; *Pseudofulvimonas gallinarii*; *Subsaxibacter sp. SW215*; *Azoarcus sp. b303*; *Terrimonas sp. YJ03*; *Ohtaekwangia koreensis*; *Ohtaekwangia kribbensis*; *Lewinella cohaerens*; *Sneathiella chungangensis*; *Phycisphaera mikurensis*; *Planktosalinus lacus*; *Azoarcus sp. b14*; *Flavobacterium sp. SCGC AAA298-K20*; *Thauera linaloolentis*; *Thauera sp. Deco7-TCBS-7BB-c-3*; *Rickettsiella sp. RKTSLLA T1705*.
- It is to be noted that the DNA data are not completely thorough, as there are also agents that still remain unknown (E-mail correspondence with Sandgren, August 2022).
39. Interview with Sandgren 21.1.2022.
40. Interview with Sandgren 21.1.2022.
41. See Batchen, 2002, pp. 129–133.
42. Haraway, 2016, p. 32 and *passim*.
43. Haraway, 2016, p. 2.
44. *Ibid.*
45. See Sandgren, 2022.
46. Interview with Sandgren 21.1.2022.
47. Haraway, 2016, p. 58.
48. Marder, 2013, p. 67.
49. Batchen, 2016, p. 5.
50. *Ibid.* Cameraless photographs are important not only as a developmental stage in photography's history in general, but especially as photographic art. See Batchen, 2016.
51. Batchen, 2016, p. 12.
52. See Batchen, 2016.
53. Marder, 2013, pp. 153–154.
54. See Marder, 2013, p. 142.
55. See Silverman, 2015.
56. Although supposedly vanishing photographs and videos are present in contemporary culture through social media (see Palmer Albers, 2021, p. 5; and *passim*).
57. See Palmer Albers, 2021, p. 2.
58. Palmer Albers, 2021, p. 6.
59. Palmer Albers, 2021, p. 13.
60. See Palmer Albers, 2021, p. 109.
61. Palmer Albers's wording (Palmer Albers, 2021, p. 114).
62. See Palmer Albers, 2021, pp. 116–117.
63. See Benjamin, 2008 [1931].
64. See <http://instagram.com/yeastograms>
65. Palmer Albers likewise notices a new conditional framework for photographic visibility produced by contemporary artists and characterizes it as a durational process to be performed and experienced (see Palmer Albers, 2021, p. 4). The contemporary artists she writes about include Phil Chang, Matthew Buckingham, Oscar Muñoz, Cassils, Trevor Paglen, Zachary Norman, and Hank Willis Thomas. (*Ibid.*)
66. Marder, 2013, p. 103.
67. Kunsthalle Helsinki 11.9. – 31.10.2021.
68. Interview with Eskola 14.12.2021.
69. "Weakening, like deconstruction, does not search for correct solutions wherein thought may finally come to rest, but rather seeks ontological emancipation from truth and other concepts that frame and restrict the possibilities of new philosophical, scientific or religious revolutions." (Gianni Vattimo & Santiago Zabala, "Foreword", in Marder, 2013, p. xii; see also Marder, 2013, p. 7).
70. Do It Yourself / Do It With Others.
71. Interview with Sandgren 21.1.2022.
72. See Rotko, 2015, p. 21 on the ethics of killing a research animal; and Radomska & Åsberg, 2020.
73. See Jane Vuorinen, "More-Than Photography and Sculpture: A Diffractive Reading", *Photographies* 15, no. 3 (2022), pp. 405–423. DOI: 10.1080/17540763.2022.2108885
74. Haraway, 2016.

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**ABSTRACT**

The concept of nonhuman in relation to photography has recently been mostly theorized through technology, while organic nonhuman agents and processes at work in photography have received less attention. In this article, works by three contemporary Finnish artists who incorporate organic materials and processes into photography are analyzed to renegotiate the borders between photography, bioart, and science. This

leads to a rethinking of the dichotomy between the concepts of technological and organic in the context of contemporary photographic art. Combining new materialist and posthumanist theories with photography history and theory allows for a multidisciplinary method that recognizes the worth of both human and nonhuman agents and processes at work. The artworks are analyzed as temporal and processual, taking into account their performative qualities.

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