



## Costume matter.

Exploring microorganisms, fungi and berries as biobased material in contemporary costume design.

Ingvill Fossheim

2019

Master of Arts Thesis

30 ECTS

Department of Film, Television and Scenography

Master's degree programme in Design for Theatre, Film and Television

Major in Costume Design

Aalto University School of Arts, Design and Architecture

Thesis supervisor and advisor, written part: Professor Dr. Sofia Pantouvaki

Thesis advisor, written part: Professor Pirjo Kääriäinen

Thesis advisor, artistic part: Costume designer Taina Relander



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**Author** Ingvill Fossheim

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**Year** 2019

**Number of pages** 81

**Language** English

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### Abstract

Costume materiality has emerged as a current focus in costume theory and practice, as is the significance of costume material and costume as material with agency. Biobased material development is a rapidly evolving research landscape in a variety of fields, as well as a timely topic given the current global considerations of the impact of human activity on the environment. Material knowledge is a fundamental part of a costume designer's practice, yet how biobased materials can be explored and understood as medium for subjective creative expression through contemporary costume design is currently understudied.

This thesis is a personal exploration and reflection on working with selected species of fungi, algae, berries and microbes as medium in costume design. This thesis aims to present biobased materials as viable material alternatives in contemporary costume design, and to explore how selected such materials may be assimilated into the complex processes of costume design and collaborative performance making.

This thesis consists of an artistic exploration with biobased materials in the context of costume design, through three specific contemporary dance productions, and a written study reflecting on this practice. The artistic component is located within my own work as costume designer on the dance production *a life - nomadic melodrama* (2017), which, together with the productions *Posthuman* (2016) and *Posthuman days* (2018) inform the thesis. These three contemporary dance works are connected through using specific new materialist philosophy as theoretical starting points for the collective performance making process, and through my approach as costume designer exploring a biobased costume materiality as a conceptual response to this theory. I apply a multi-method research approach to this practice-based thesis

In this written reflection and analysis of the works I attempt to trace a narrative of my personal artistic process of engaging with biobased materials in relation to costume design, and how this material approach has affected my understanding of costume materiality in the context of live contemporary dance performance. My costume material approach is a continuous enquiry that develops from one production to the next one, and in this written thesis I trace, analyse and reflect on this process.

This thesis suggests that biobased materials can not only be viable as material alternatives in costume practices, but also have the potential to generate interesting aesthetic and performative qualities to the materiality of a live performance when embedded into the shared process of performance making.

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**Keywords** costume design, costume materiality, biobased, material, colourant, biofabrication, natural dyes, algae, microbial cellulose, contemporary dance, performance making

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## ACKNOWLEDGEMENTS

Thank you to my thesis supervisor and advisor Dr. Sofia Pantouvaki, Professor of Costume Design for Theatre and Film at Aalto University, for your unwavering support, critical input and patience throughout this thesis research project.

Thank you to my thesis advisor Professor Pirjo Kääriäinen, Professor of Practice of Design driven fibre innovation at Aalto University, for your valuable input on this written part of the thesis and for encouraging me to pursue the microbial cellulose experimentations during the ChemArts summer school.

Thank you to my thesis advisor Costume Designer Taina Relander, for your support on the artistic thesis work through insights and sound advice throughout the performance making process.

Thank you to the staff at the Aalto Studios Costume workshop and the Theatre Academy Wardrobe department, especially Johanna Ilmarinen, Anja Behm, Sirpa Luoma, Anne Lehto, Arja Nuppola and Nina Paakkunainen.

Thank you to the staff and students of ChemArts and Bio2, especially Professor Tapani Vuorinen, Nina Riutta, Iines Jakovlev and Jinze Dou.

Thank you Dr. Jinguang Hu, for sharing of your knowledge on microbial cellulose.

Thank you Kristina Junttila Valkoinen, Johanna Oksanen and Tua Helve for your readings and feedback at different stages of the thesis process.

Thank you Marjo Lemponen, for your much appreciated translation.

Thank you to expert on medicinal plants Rolv Hjelmstad, for permission to use your photo of the chaga fungi in this thesis.

Thank you to my artist collaborators, especially choreographer Jenni-Elina von Bagh.

Thank you to my fellow students, for community and support.

Takk til min kjære familie.

# 1 INTRODUCTION

## 1.1 Thesis Topic and Background

Biobased material development is a rapidly evolving research landscape in a variety of fields including textiles, fashion and most recently, costume, as well as a timely topic given the current global considerations of the impact of human activity on the environment. Interdisciplinary communities of researchers, including artists, scientists, designers and entrepreneurs, currently explore new material frontiers through the development of biobased materials and their applications in subfields such as biodesign, biofabrication, synthetic biology etc. Frequently, these innovative material approaches share a common ground in attempting to find solutions to some of the present day challenges relating to harmful material production processes and systems. Another shared feature of these emergent materials and applications is the potential for new material aesthetics and engagement.

Costume is a diverse field of artistic practice, which over the past decade has been the subject of an increased scholarly focus and established field in academia. In contemporary costume theory and practice, costume materiality has recently emerged as a topical focus (Pantouvaki 2019, Taylor 2019), as has the significance of costume material and costume as material with agency (Barbieri 2017, Trimmingham 2017). Material knowledge is a fundamental part of a costume designer's practice, yet how biobased materials can be explored and understood as medium for subjective creative expression through contemporary costume design is currently understudied and in dynamic development.

This thesis is a personal exploration and reflection on working with selected species of fungi, algae, berries and microbes as medium in costume design. The thesis aims to present biobased materials as viable material alternatives in contemporary costume design, and to explore how selected such materials may be assimilated into the complex processes of costume design and collaborative performance making. As motivating and inspiring force for researching this thesis is the hypothesis that experimental costume design processes where biobased materials are engaged enable the emergence of new aesthetics and methods; through that, new modes of artistic expression and stage narratives emerge.

The thesis consists of an artistic exploration with biobased materials in the context of costume design, through three specific contemporary dance productions, and a written study reflecting on this practice. The artistic component is located within my own work as costume designer on the dance production *a life - nomadic melodrama* (2017), which, together with the productions *Posthuman* (2016) and *Posthuman days* (2018) inform the thesis. These three contemporary dance works are connected through using specific new materialist philosophy as theoretical starting points for the collective performance making process, and through my approach as costume designer exploring a biobased costume materiality as a conceptual response to this theory.

I explore selected biobased colourants and the fabrication of microbial cellulose, as costume materials and as components of collective performance making processes, from the subjective perspective of myself as costume designer. The choice to incorporate these materials into the costume design process was a conceptual response to the theoretical starting points of each work, as well as a choice rooted in my personal values and interests as artist. The structure of trilogy made it possible for me to pursue this research interest



over some time, and to progress from working with plant- and algae based dyes and pigments to the manipulation of living microbes.

Performance making is a complex and collaborative process. In this written reflection and analysis of the works I attempt to trace a narrative of my personal artistic process of engaging with biobased materials in relation to costume design, and how this material approach has affected my understanding of costume materiality in the context of live contemporary dance performance. My costume material approach is a continuous enquiry that develops from one production to the next one, and in this written thesis I trace, analyse and reflect on this process.

## 1.2 Thesis Overview

Chapter one outlines this thesis research project. Chapter two presents my personal motivation and establishes this thesis research in relation to my view on costume and narrative as artist researcher working through costume. Chapter three presents a review of related practice and theory. Chapter four expands on the subject framing and research methodology. Chapter five presents the set-up and the findings from the explorations with biobased materials through a costume design process which constitutes my artistic work. Chapter six follows with a reflection on these findings in relation to the thesis research question. Chapter seven provides a conclusion on this work as a whole and speculates towards possible biobased material costume futures.

## 2 CONTEXTUALISING THE TOPIC THROUGH A PERSONAL PERSPECTIVE

The diverse ways by which a performance emerges through process and collaboration has been a long-standing subject of fascination for me. As costume designer and scenographer<sup>1</sup> it has led me to seek out and explore a variety of form and approaches for collective performance making through nearly fifteen years as a professional in the field. In recent years, the need to critically contextualise my working methods and materials, and to develop my practice more in alignment with personal values, has felt increasingly pressing.

On an ideological level I believe that the arts must take its responsibility towards a better world through our actions and practices, and that questioning established traditions and systems involving environmentally harmful materials and material processes is part of this action. As costume designer I have agency to influence the material realisation of my own works, and through this I may raise awareness and make a contribution towards changing practices.

Entering a second round of master`s degree education in my mid-thirties was a strategic move to facilitate a different kind of praxis-space for myself, and to connect with a larger community of artists researchers. On a personal level it felt necessary to allocate time and resources for re-orienting the premise of my artistic work, including the material means I employ to think and express through costume: What narratives might be available through less conventional material engagements and experiences in performance? As an artist, how

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<sup>1</sup> I define the *scenographer`s* work as a wholistic practice which includes both the costumed and the spatial elements of a performance. See also footnote in chapter 5 p. 20

<sup>2</sup> Niinimäki, K. (2018). Discussion during the course Sustainable Fashion and Textile Design 15.05.2018.

<sup>3</sup> To my knowledge there is no clear concensus about the exact definitions of scenographer and

can I establish a costume design practice in dialogue with current innovations and developments towards more environment-friendly and responsible production processes and systems? And how to negotiate this personal material approach with the demands of collective, collaborative performance making and the art form of live performance?

Through my current MA degree studies in Costume Design and this thesis it has been possible for me to expand the methods, tools and resources available to me as costume designer, and to open up this exploration and conversation in a wider community of artists. My perspective as costume designer developed both through and between the productions. The initial focus of the first production, *Posthuman* (2016), was a more playful, free and open exploration of costume, body and movement, as well as learning and developing a shared language with the choreographer and the other collaborating artists. For me it was a significant project as it shifted my thinking on how my practice, and interests, could meet with this form of contemporary dance. Although my wish to replace synthetic dyes with natural colourants, and to incorporate these biobased alternatives into my costume work had been around for some time, the decision to explore the speculative concept of a strengthening chaga dye emerged from the context of such rehearsal process, as opposed to being a premeditated design decision. For the subsequent *a life - nomadic melodrama* (2017) and *Posthuman days* (2018) I applied more pre-planned and structured approaches to the material inquiry with increasing attention towards the biobased material as a conceptual component with expressive and affective agency as costume. These production processes also included more articulated strategies for embedding the material itself into the shared process of performance making.

I understand costume as context-specific and relational. By context-specific I mean that costume, as a subjective creative expression, is intrinsically tied to the context of a specific live performance situation, where "as a material, performed-in object" it "renders ideas physical and embodies thoughts, (...) histories, states of being, and previously unimagined futures in the temporary space of the performance." (Barbieri 2017: xx) By relational, I wish to emphasise how the material costume is at the same time an evolving material archive of relations: between the bodies, hands and processes that made it, the bodies that inhabit it, and the movements and environments in which it has performed before, emerging anew and differently through each experienced performance.

The choice and use of materials is integral to the practice of the costume designer. As costume designer, I frequently engage with hands-on making processes as method to advance a design idea. The materials I choose to handle are often synthetic dyes and commercially produced textiles; materials well established across the costume production industry. Through this thesis research I want to challenge this habit and encourage a more lateral material approach, exploring less conventional costume materials and processes.

### **3 REVIEW OF RELATED PRACTICE AND THEORY**

In this chapter I present a review of related practice and theory, focusing on biobased pigments, microbial cellulose and costume theory. I briefly explain how these relate to my thesis research.

The use of natural pigments as part of a costume design aesthetic can be seen in costume and set designer Rolf Borzik's work on *Rite of Spring*, choreographed by Pina Bausch for Tanztheater Wuppertal in 1975 (Tanztheater Wuppertal 2019). In this highly influential

work the costumes are activated and transformed through the material interactions between the sweaty bodies of the performers, their movements and the peat covering the stage floor; the peat becomes a source of colour, changing the colour and textural expression of the costume garments and also the skin and hair of the performers. This emerging and temporal change and transformation in costume, as a direct impact of each specific dancing body in the specific stage environment, had a strong impact on me when I experienced this performance as an audience member in London in 2008.

The inclusion of biobased materials as costume element into dance performance context seems to be most commonly done by applying natural substances, such as peat, onto the performers' costumed bodies through material interactions in the live event. Another, more recent, example is scenographer Signe Becker's costume work on *Paradise Now* for Verk Produksjoner, in which the performers pour yoghurt, kefir and chocolate sauce onto themselves and each other as an integrated part of the performance (Becker 2014). As an audience member at this performance in 2016 I was struck by how affective these natural substances were through smell and vision, and how this was perceivable because of the proximity between the performers and the audience members.

For this thesis research, I searched for examples of contemporary or recent costume design practices and/or literature where biobased colourants are studied and explored. I could not find examples of this. This lack might be because costume production frequently needs to meet demands for fast results, which favours streamlined dyeing procedures where the fast, predictable and easily replicable synthetic dyes are preferred to less established alternatives such as natural dyes. There seems to be a gap in the knowledge exchange between the costume field and the field of biobased material development. Therefore, to find contemporary dyers specialising in the use of natural colourants as part of an artistic practice, I looked to the fields of fashion and textile.

As such, the practice of the New York-based studio ALR Dyes was an important source of inspiration at the beginning of this thesis research project. ALR Dyes is established and run by dyer and designer Audrey Louise Reynolds. Referring to the practices of the clothing industries, but relevant for costume, Reynolds argues that "chemical dyes can be really bad for us (...) we are absorbing the bad properties of dyes into our bloodstream through wearing." (Reynolds 2019) She asks "could we absorb the good properties through wearing things that are beneficial to our health?" (Ibid.) An explicit focus of ALR Dyes is on all-natural ingredients, developing colourants from a variety of sources, including minerals, insects, squid and plants. Referring to the actual dyeing procedures, Reynolds states that ALR Dyes avoids the need for a caustic step in the dyeing process by "not causing a fiber reaction; we are embedding light pigments from nature into fabric." (Ibid.)

Other practitioners (Niinimäki 2018<sup>2</sup>) might call for a more nuanced approach to Reynold's generalised claim on the harmfulness of commercially available chemical dyes, however, in the context of performance making her argument carries resonance and reasons for critical reflection. In the often stressful, result oriented and time-pressured circumstances of costume dyeing: how probable is it that performers are asked to wear freshly dyed costumes that, despite all good intentions, are not sufficiently washed at the end of the dyeing process and still contain chemicals potentially harmful for the human body? Contemporary dance practices frequently involve intense physical activity and high

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<sup>2</sup> Niinimäki, K. (2018). Discussion during the course Sustainable Fashion and Textile Design 15.05.2018.

body heat. As the moving body's skin opens its pores to ease perspiration and cool down the body in question, does it also as an organ open itself as more receptive to substance absorption?

Another practice relevant for the thesis research is the material developments of the Berlin-based design studio Blond & Bieber. Blond & Bieber has developed a series of "concepts, products and processes" (Blond & Bieber 2019), where the production and application of dyes and pigments from microalgae is central. Interesting for costume, their project *Algaemy* (Weber 2015) showcases the chance discovery of a performative potential of their colourants: by exposing fabrics printed with algae-dyes to UV light from the sun for some time, the colour palette changed radically "from green to blue, from red to yellow" (Ibid.). Although my explorations of microalgae as colourant in *a life - nomadic melodrama* were quite different, the material thinking of Blond & Bieber, in which the unstable and evolving colour character of a pigment is embraced as a design benefit, was a source of encouragement and influence for me when I developed my costume designs.

Relevant literature on biobased colourants includes *Luonnonväriaineet* (Räisänen et al. 2015) and *Natural Dyes: Sources, Tradition, Technology and Science* (Cardon 2007), both of which were informative for my work. Although my explorations with biobased dyes did not follow the protocols nor use the colourants presented in these two publications, these books are important for my thesis research. The publications provide information on a diverse and extensive selection of biobased colourants (incl. fungi, insects, lichen, mud, macroalgae, plants), supplemented with a presentation (Räisänen et al. 2015) of emerging biobased dyeing practices exploring less common colourants (incl. bacteria and microalgae). Combined, these two publications present a varied range of dyeing protocols, from traditional to more experimental, as well as chemical analysis of the dyestuff and chemical reactions at work. This technical and practical information is useful for me as costume designer. It helps me to better understand the composition of the material and processes of transformation, and I can apply this knowledge to support my costume material explorations and experimentations. However, it is by additionally presenting the historical and cultural context of each colourant and its specific uses, that a rich and complex world of natural colourants is opened up, and my understanding of these materials as agents and carriers of cultural meaning is expanded.

These main references for biobased colourant related practice and theory could all be considered as examples of a contemporary movement calling for a "paradigm shift from the present era of synthetic dyes" (Cardon 2017) in which "worldwide awareness of the harmful consequences of the pollution resulting from the production and use of some synthetic colorants has led to a significant revival and renewed interest in natural colorants. As potential renewable resources, natural dyes are an integral part of the major issue of our time: sustainable development" (Cardon 2007). Both sources address the necessity of responsible practices when the use of dye plants is concerned: to protect and sustain natural ecosystems and biodiversity, to cause no harm to nature. As Cardon stresses: "Dye plants can be renewable resources (...) but only under certain conditions" (Cardon 2017). This is particularly critical if biobased colourants are harvested from the wild, whether it is for use on a larger scale or if explored through costume.

The centrality that biobased colourants may have in future material research has significant implications for my costume thinking: it suggests a potential for costume to engage in

topical debates and critical discourse beyond costume and the live performance through costume materiality.

In the context of costume, practitioners and theory exploring biobased material fabrication, such as the production of microbial cellulose, has been hard to come by. To find examples relevant for this thesis research I have again looked to the field of fashion, and I have looked to bioart and chemistry for further reference.

The exploration of microbial cellulose as a material used to make wearable garments is known especially through the pioneering work of fashion designer Suzanne Lee and her design consultancy BioCouture (Lee 2018), of which I was aware of at an early stage of this thesis project. Lee fabricates her own materials by growing microbial cellulose cultures in custom made containers, and creates garments from this cellulose e.g. by moulding the wet microbial cellulose sheets onto special mannequins. As this wet cellulose dries it keeps the shape from the mould and it can attach to itself, forming a seamless bond between cellulose and cellulose (Lee 2011). The microbial cellulose garments in BioCouture resemble clothing made from conventional textiles; in shape and through colouring and details such as zips, pockets, seams and buttons. Lee creates these garments to showcase manufacturing systems where "the fibres, the material itself and the formation of the garment has been done by a microbe rather than a plant" (Lee 2014) and the possible material futures such systems can generate. Lee's emphasis of working with other living systems for new materials and material properties, e.g. the possibility for a material to regenerate, is a material thinking and practice which informed my conceptual choice of incorporating the exploration of microbial cellulose into the performance making process and as a costume material on *Posthuman days*. I was intrigued by the possibility to incorporate these other living systems into the production process, and to explore what this might bring to the process of performance making.

Lee's work was a valuable source of information on protocols for cultivating microbial cellulose and possible procedures for turning this material into wearable garments. Although I moved away from the idea of a costume constructed similarly to a piece of conventional clothing with techniques involving sewing, the access to insights based on Lee's experience was helpful to advance my own design and research.

Another practitioner with a relevant interest in microbial cellulose is the bioartist and PhD-candidate Margherita Pevere. Pevere engages with microbial cellulose in several of her artworks, including her ritual performance piece *Eingeweide* (Pevere 2018). In this work, a sheet of wet microbial cellulose is onstage and manipulated by Pevere as an object and as material on and with her body. I was not yet familiar with *Eingeweide* early on while designing *Posthuman days*, but I think it is interesting to note how the two performances, hers, and mine, developed approximately at the same time, approaching the microbial cellulose material as substance and object in the live performance context. Similarly to Lee, Pevere has been an important source for existing knowledge on microbial cellulose cultivation and how this material might be explored in different stages of dryness/wetness in the context of artworks.

"(P)erformance of materiality can become the means for a theoretical discourse on the deep connections between body, costume and material and a tool to propose new performance narratives that are generated through costume - with costume understood as an integral conceptual and material entity" (Pantouvaki 2019).

In costume theory and research there is an emergent interest in costume materiality and material agency, as articulated by Sofia Pantouvaki in the above quote from her recently published text *New Materiality in Costume Design* (2019). In this text, Pantouvaki initiates a critical conversation on "the role and significance of materiality for the field of costume design". In doing so, she emphasises the centrality of artist/artist-researchers engaging with material explorations "as a method for new costume design and for the making of new performance" in order to investigate "the agency of materials as conceptual and expressive tools for costume creation"(Ibid.: 150) For my thesis research, this text is particularly relevant to locate my project in relation to more specific research interests within the broader field of costume research and theory. Another important publication for this thesis, in dealing with costume materiality and agency, is Donatella Barbieri's book *Costume in Performance: Materiality, Culture and the Body* (2017), which includes a chapter penned by Melissa Trimmingham. In this publication, costume is viewed as a method "through which performance can happen, costume embodies histories, states of being, and previously unimagined futures in the temporary space of the performance" (Ibid.,; xxii)

#### **4 FRAMING OF THE SUBJECT AND METHODOLOGY**

A key interest for me on is to develop my understanding of costume materiality. I have worked towards this direction in this thesis through increasing my material knowledge and finding methods to facilitate a fluid exchange between my material explorations as costume designer and the creative process shared by the collaborating team.

I have chosen to narrow down this broad topic by focusing on selected biobased materials and applications. I focus on specific fungi, berries and microalgae as colourants for dyeing existing fabrics for costume, and on cultivating microbial cellulose that I can explore as costume material in itself.

I locate these material explorations in my own praxis as costume designer and in the context of three specific contemporary dance performances. There is an artistic conceptual connection between the design choices and the new materialist philosophies informing the shared performance-making processes. I applied a multi-method research approach to this practice-based thesis.

##### **4.1 Research Questions**

Through this thesis, I attempted to answer the research question:

*How can bio based materials and their unique qualities be assimilated into contemporary costume practice?*

My aim is to present biobased materials as viable material alternatives in contemporary costume design, through an artistic exploration of how selected such materials may be assimilated into the complex processes of costume design and collaborative performance making.

This main research question is supported by the following sub-questions:

- What are the benefits and challenges of biobased materials as costume material?
- In what ways can these material choices be understood and have impact on a practical, technical level in artistic practice?

- What are the aesthetic qualities that these materials bring to costume design and to the performance as a whole?

#### **4.2 Methodology**

To answer my research questions I apply Nelson's method of multi-modal inquiry framed as Practice-as-Research (PaR) (Nelson 2013) to structure my analytical thinking and understanding. I organise this inquiry as three main activities: i) costume material research and development, ii) applying this material into the context of contemporary dance performance, and iii) a written analysis and reflection in response to this practice. The first two activities are based on my artistic practice, i.e. my work for the three aforementioned contemporary dance performances. The combination of these modes of enquiry enables what, in accordance with Barrett, may be understood as praxis: "a movement between what is known and what will be revealed" (Barrett & Bolt 2007: 186).

The primary method for answering the research questions is artistic practice, which constitutes of my material experimentations and applications. These took place in the costume workshop's dyeing facilities, in the ChemArts/Bio2 laboratory, in my costume designer studio, in the shared rehearsal environment, and in the live performance situation.

Each of these settings offered specific possibilities and complimentary support for my research process:

In the costume workshop's dyeing facilities I had space and time to freely explore on my own terms how my materials - the fungi, algae and berries - could be worked with as biobased colourants on selected protein- and cellulose based textiles, and to benefit from the extensive knowledge and support of the costume workshop staff members.

In the chemistry laboratory I had a dedicated space for cultivating my microbial cellulose material, as well as access to the equipment, machinery and substances there. By being in the laboratory I found myself located in an environment of interdisciplinary teams of researchers and experts who were committed to fundamental material research and development, and who were willing to answer my questions and share of their insights, thus expanding my understanding of materials from perspectives which were new to me.

The costume designer studio provided a more solitary and calm place where I could do preliminary studies and tests of the materials, and develop my costume design ideas in preparations ahead of, and in-between, the collective work sessions of the rehearsal process.

The shared rehearsal environment offered me the possibility to explore and challenge the materials in the actual context of performance making: with and on the moving bodies of the performers and the choreographic language in particular. This opened my personal artistic research up into a creative, practical and philosophical dialogue with a wider group of practitioners. The rehearsal process was also the phase of my design process where I could study how the biobased costume materiality interacted and developed with other material and immaterial stage components such as space, sound, light and temporality. Technical issues, such as material change and deterioration through usage, and possible procedures for maintenance, were also studied during the rehearsal process.

The performance situation offered me the possibility to disseminate my research outcomes to a wider public through the contextualised and lived experience of contemporary dance performance. In the example of *Posthuman days* my biobased costume material approach, e.g. microbial cellulose production, was articulated to the

audience also through programme text in the production's printed programme (see Appendix 1).

The model of the "iterative cyclic web"(Smith and Dean 2009: 19-25) is helpful to illustrate how the various components and modes of my research methodology could interact as the research process progressed. Through the process of iteration, the work taking place in one setting, i.e. the rehearsals, could feed into the work in another setting, i.e. the laboratory and/or costume design studio. Thus I could plan and prepare an experiment, execute and study the experiment, reflect on what emerged as a result, and to allow this information and experience to affect the next round of experimentations, with adjustments and developments to drive the research further.

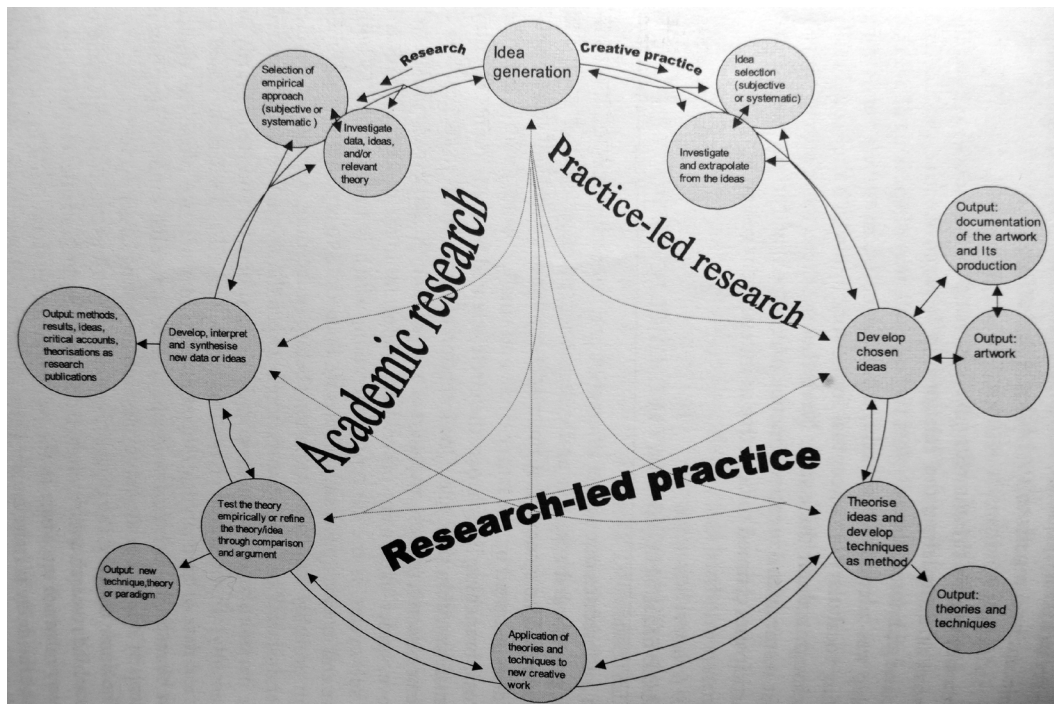


Figure 1 The iterative cyclic web according to Smith and Dean (2009: 20).

I have collected data through the formats of personal journal notes, sketches, protocols, photographs, audiovisual recordings and material samples. By keeping a journal with notes and sketches I logged the material explorations as well as my process of thought, observation and speculation throughout the thesis research project. This documentation allowed me to retrospectively trace the practical developments and how my costume thinking evolved throughout the research project. The protocols document the procedures I used for my material experimentations in the dyeing facilities and laboratory, supported by photographs of work-in-progress and physical material samples of the results. Photographs and audiovisual recordings were particularly helpful in the rehearsal- and performance situations for documenting the practical tasks, sometimes also capturing experiential and expressive aesthetic phenomena which emerged through the interactions between the biobased costume materiality, the moving bodies of the performers and the stage environment.

As biobased and biofabricated materials are not commonly the focus of costume design practice and research at the moment, I have sought out to supplement this research with



knowledge sourced from the fields of material research, incl. from applications in fashion and textiles, as well as from various other directions of biobased arts and design, and chemistry. To achieve this, I participated in selected relevant courses at Aalto University, I attended topical conferences and seminars, I consulted specialists on material development, artists and designers working in the fields of bioarts and biodesign, as well as publications on bioarts/biodesign/biofabrication and on the larger topics of environmental sustainability and systems thinking such as circular economy.

The artistic work took place in periods between autumn 2016 and autumn-winter 2018, and it was carried out at the wardrobe departments at Aalto Studios (Aalto University) and Theatre Academy (UniARTS Helsinki), at the ChemArts/Bio2 laboratory of Aalto University, and my own work space. Rehearsals and performances took place in the facilities of Aalto University, the Theatre Academy, and at Zodiac - Centre for New Dance, all of which were the organisers and producers of the dance productions that were the basis of this thesis.

## **5 EXPLORING COSTUME AND MATTER WITH BIOBASED MATERIALS**

In this chapter I present my explorations with the selected biobased colourants and microbial cellulose as costume materials. To contextualise the material research within each specific performance making process, I briefly present the shared interests and aims of the collaborating artists on a more general level, as well as my interests and aims as costume designer. This is followed by a more detailed description of the aims and methods I applied in order to study and explore the selected biobased materials as costume material, and a presentation of the experiments. I wrap up each production with a summary of key findings and considerations for next iteration.

Appendix 1 provides more detailed information about the productions, such as the artistic teams, venues and performance dates. These appendices also include links to online video documentations of the performances and facsimiles from the performance programmes.

## 5.1 Set-up of Production 1: *Posthuman* (2016)

*There are only haecceities affects subjectless individualities of all kinds.*  
- Gilles Deleuze



Figure 2 Performance documentation photo. Chaga dyed silk fabric, synthetic wig, sourced boots, bodypack transmitter, plastic tube. Photo by Katri Naukkarinen.

### **5.1.1 Interests and Aims - Team**

*Posthuman* was part of the course "Dance as a Comprehensive Work of Art", in which collaboration between different disciplines of artistic expression was in focus. Participating students were from the study programmes of costume design and scenography at Aalto University, and choreography, dance, lighting design and sound design at the Theatre Academy. The course took place during the autumn of 2016, with public presentations in the large Theater Hall (Teatterisali) of the Theatre Academy in early December 2016.

*Posthuman* was the first collaboration between this team of artists. There was a shared interest in the concept of collective process, and we wished to explore what "a collective process" might mean for this specific team of collaborators. This was in line with the general agenda of the course. As a creative starting point there was a shared interest to research theories on posthumanity, and to explore how this theoretical reference material might inform our transdisciplinary creative praxis. Through the method of collective readings, speculative analysis and critical conversations based on topical texts and concepts, we aimed to get to know each other better as collaborators and to establish a common ground to work from creatively.

The selected reading material included contemporary philosopher and feminist theoretician Rosi Braidotti's book *The Posthuman* (Braidotti 2013). In this book Braidotti provides a critical overview on the historical trajectory and (then) current field of posthumanist philosophical thinking, followed by an argument for the need to alter the perspective: from human-centeredness to a worldview considering all forms of life. In her theorising, Braidotti locates her work and current new materialist thinking in relation to the writings of French psychoanalyst Felix Guattari and French philosopher Gilles Deleuze. Their publication *A Thousand Plateaus* (Deleuze and Guattari 2013), originally published in 1980, provided the working group with inspirational textual material to grapple with, both in terms of content and of writing style. Some of Deleuze and Guattari's concepts emerged as particularly interesting to work with in context of our production. These included *assemblage* as a concept "dealing with the play of contingency and structure, organisation and change" (Wise 2011: 91) to be understood as "a becoming that brings elements together" including "the qualities present (...) and the affect and effectivity of the assemblage: that is, not just what it is, but what it can do" (Wise 2011: 92). In Deleuze and Guattari's own words, an assemblage is a "multiplicity" (Deleuze and Guattari 2013: 2) which "has neither subject nor object, only determinations, magnitudes, and dimensions that cannot increase in number without the multiplicity changing in nature (...) The interplay approximates the pure activity of weavers attributed in myth to the Fates or Norns" (Deleuze and Guattari 2013: 7).

In the rehearsals, these concepts were applied through different choreographical tasks, and a performative world of playing with the 'being in the inbetween' - slipping from recognisable to not recognisable, of being almost something - emerged. The theme of 'posthuman' was acknowledged as part of the process in the form of continuous questions with the working group being part of these questions, speculating through the medium of live performance.

### **5.1.2 Interests and Aims - Costume Designer**

*Posthuman* was the first performance for which I designed the costumes within the frame of the MA degree programme in costume design. Being accustomed to the role of

*scenographer*<sup>3</sup>, i.e. having the responsibility of designing the scenographic space and the costumed bodies inhabiting it as a whole, I was curious to explore how I could adapt and evolve my artistic process and tools to the role of "only" costume designer. Thus, a primary aim of this team collaboration for me was to understand how to work together, and to establish my own expression as part of the holistic artwork created by a large-member team. In extension of this, a main interest for me on *Posthuman* was to explore costume as *materiality-with* the human body: as material, object and movement affecting on and affected by the dancers' bodies. This approach towards costume materiality marked the beginning of what became the focus of this thesis research.

The highly articulated bodies of the dancers inspired me to approach the dancers' bodies as site, perhaps similar to the way I would have approached a performance space as site when developing a scenographic intervention. Very early in the course, the costume design tutor introduced the exercise of drawing the performer during movement improvisation tasks, similarly to croquis or life drawing, but with a continuously moving body or bodies. This exercise helped me to observe the moving bodies, and to connect these observations to mark-making with my hands, expressed through drawing. I decided to use this task actively in my costume design process as a method to study each performing body and to access the choreographic language by tracing its movements. By drawing the performers' movements during the rehearsal improvisations and tasks, I could connect the site of the performing body with movements in a spatial and temporal context through this act of tracing and mapping on paper. The act of observing and drawing helped me in observing and responding to each performer's body, as a moving site located in a temporal and spatial context, and to process the materiality of the moving bodies in connection to my material costume design ideas.

I was intrigued by the male-only dancer casting in the context of "post-human" and feminist philosophical discourse, and I thought this combination was both a paradox and a provocation. Was there a suggestion, through the casting, that the posthuman world of our performance was inhabited by males only? Or perhaps that genderedness as a male/female binary was not an issue? Speculating on possible 'post-human humans', I was interested in exploring costume as reference and play with current 'signifiers' of costumed bodies as male or female. Through the costume design process I was interested in exploring notions of gendered garments, and to reference the long and layered cultural history of men in skirt-like wear as well as the tradition of similar garments as costume in contemporary dance context. For historical references I looked at drawings and descriptions by Max Tilke (Tilke 1945, Indiana University Bloomington), a German illustrator and ethnographer who, in the early 1900s, studied and documented historical and folk clothing traditions through drawing and photography. I also looked at archaeological finds such as the stoneage artifacts that were part of the "Ötzi the Iceman" discovery (South Tyrol Museum of Archaeology 2016). These sources were useful for me in looking at historical

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<sup>3</sup> To my knowledge there is no clear consensus about the exact definitions of scenographer and scenography: the role of the scenographer and what scenography does can be fluid and diverse. When I discuss scenography, I consider costume as a part of the scenographic praxis and experience (and thus included into the definition of scenography/scenographer), but this may be understood differently depending on the performance-making traditions and cultures one is located in relation to. For me, the definition articulated by the British scenographer and director Professor Pamela Howard in her monograph *What is scenography?*, in an answer to that very question, is helpful in embracing the multiplicity of the profession: "*Scenography is the seamless synthesis of space, text, research, art, actors, directors and spectators that contributes to an original creation.*"(Howard 2001).

solutions for functional and economical utilisations of available materials, and looking for variations in adaptations of protective garments and footwear.

The costume idea was grounded in repetition, basic geometrical shapes and relatively simple construction techniques. The three performers wore variations of the same design: I imagined a world-logic where the main costume garment could be shaped and reshaped as a functional object onto the wearer's body, by the wearer, to serve a variety of purposes. Based on a rectangular shaped fabric, a folded and wrapped costume garment was developed, scaled and adapted in relation to each performing body and its movements. Ready made items such as protective footwear and artificial hair were included, and technology for sound transmission incorporated as part of the costume designs. I wanted to reference the (for me) complex philosophical concepts in a concrete but superficial way, for example the Deleuzian "fold" by quite literally having folds, folded and folding/unfolding fabric as part of the costume design.

I was searching for another way to add an element of strength and survival to the costumes, subtly through the materiality of the wrapped and folded, skirt-like costume garments. Encouraged by the material thinking of Reynolds (2016), which embraces nature-friendly colourants and the possibility that clothing can contain health-promoting properties which absorb through the wearer's skin, I wanted to explore if my conceptual idea could be achieved with the aid of traditional dyeing and medicinal practices. Looking to traditional dyeing techniques and materials made sense to me within the context of this specific work: as a source for potentially less irritating and toxic colourants, and also in relation to the topical philosophical texts and conversations at the core of the shared performance-making process. The concept of a 'healing costume', which would somehow benefit the wearer, became an inspiration and guiding concept for my biobased dye experimentations.

A few weeks into the rehearsal process I was experiencing an oncoming flu, and I happened to make chaga tea to combat it. While I was making and drinking this strengthening tea, I wondered if it could somehow be connected to the costume designs on *Posthuman*: could this be, on a conceptual level, my added benefit - a conceptually strengthening infusion for the costumes, as a colourant?

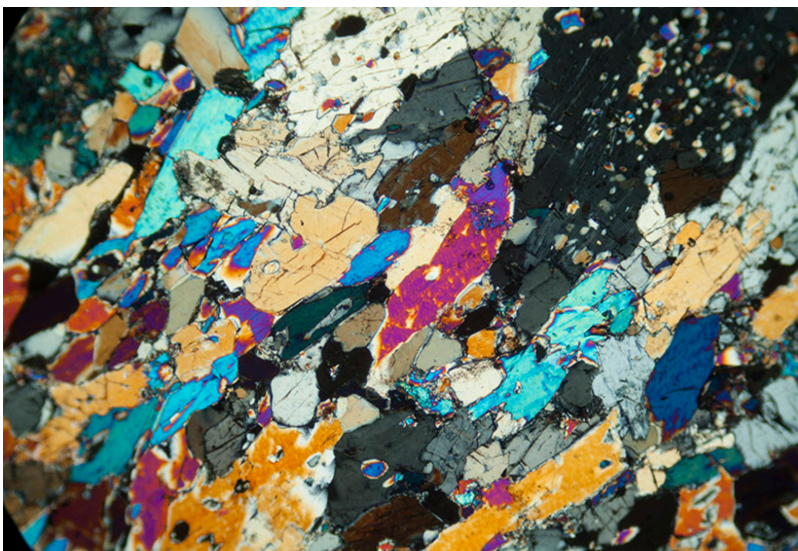


Figure 3 My main inspiration image for *Posthuman*. These minerals are from *Hollow Earth*, a project by New Mineral Collective (Tanya Busse & Emilija Škarulytė). The image is a screenshot of a photo on their webpage. Credit: New Mineral Collective.

### 5.1.3 Aims and Method - Biobased Materials

My aim for *Posthuman* was to use only natural colourants, and to avoid the use of potentially harmful mordants. I was aware of the potential challenges with unpredictable and unstable colour results, and I was keen to incorporate these in some ways into the aesthetic qualities of the costume.

I chose to explore the chaga fungi, *Inonotus obliquus*, as my main colourant. The chaga is a fungus with properties that have been documented as beneficial for the human health and immune system, and it is among the most powerful known natural sources of antioxidants (Hjelmstad 2016). Its use in medicinal practices is evidenced in documents dating back to the 16th century, and its use among indigenous peoples is believed to be much more ancient (Ibid.). I use it as a strengthening tea, e.g. to boost my immune system.

The chaga lives in a symbiotic collaboration with trees, however, unlike many other kinds of fungi located on trees, the chaga does not break down the cellulose structure of its host, and in return the tree provides the chaga with nutrients such as lignin. The chaga fungi is by some considered to be a parasite, however research suggests that it is actually taking care and looking after its partner, the birch, for example by growing itself across wounds in the bark, forming a kind of healing and protective shield over the wood (Ibid.). I was inspired by this, from my human-centered perspective, somehow generous and caring behaviour of the chaga fungi. My decision to incorporate the chaga into the process on *Posthuman* was intrigued by my personal experience with this organism, in the aforementioned experience of facing a flu; it was also based on its properties and valued presence in human culture. I thought these were interesting qualities to explore in combination with my costume design concept.



Figure 4 Chaga fungi and birch tree. It is from this wood-like, blackened and rust-coloured outgrowth of the chaga that the material for strengthening chaga tea, and my colourants, is harvested. Photo by Rolv Hjelmstad.

Since I did not find examples for reference where this specific fungi is used as colourant, I decided to start my explorations through direct dyeing, a technique for natural dyeing with which I was familiar and which did not require a complex setup.

For the direct dyeing I prepared the dye-bath by boiling dry chaga granules in water for one to two hours, followed by an immersion of the fibres to be dyed. The immersion time varied, between one hour and three days. I did not remove the chaga granules from the

medium during the immersion. I explored variations to the procedure with assistants such as vinegar and sodium sulfate.

The main fibre of study was silk, through a selection of silk fabric samples. I chose to focus on the silk fibre because of its receptiveness to dyes and pigments, and its richness as a contributing and perceived costume material in live performance context. The costume garments were made from bourette silk, a material with interesting texture, weight and movement with the body. As costume material this was utilised in combination with the colours from the chaga dyestuff and pigments.

I set up material experimentations where I tested selected materials and variations of the dyeing protocol, focusing on extending the immersion time in the dye-bath.



Figure 5 Dyeing experiments with chaga. Colour results from 1hr immersion.



Figure 6 Dyeing experiments with chaga. Colour results from 3 days of immersion.



Figure 7 Dyeing experiments with chaga. Colour results from 3 days of immersion. Both fabrics are silks. The texture on the upper fabric is caused by a synthetic substance I treated the material with before the dyeing. The texture on the lower fabric is due to the chaga colourant. The colouring and pigmentations was embraced as a feature of the designed costumes, emphasising folds and structure in the fabric. This sense of tracing, of handled material and time, added another layer of narrative to the costume garments.



#### 5.1.4 Key Findings from *Posthuman*

The findings from *Posthuman* inspired me to pursue the topic of biobased costume materialities, and they were sufficient to provide a basis for further explorations into this topic. I found that biobased colourants *can* be applied successfully in costume design practices, technically and conceptually. Conceptually, the chaga colourants and the process of dyeing supported and informed my costume design development, and contributed with layers of material meaning to this specific process. Technically, by studying the colourants and experimenting with the dyeing procedures, it was possible to learn more about the material itself, and through this find ways to incorporate specific qualities, e.g. unevenness in the colouring, into the costume materiality and performance aesthetics. Colour fading due to UV exposure did not seem to be a problem in this performance environment, which was a black box theatre space with artificial lights only. Colour fading through washing was a more relevant challenge, which in *Posthuman* was dealt with by airing, rather than washing, the costumes during the limited performance run.

I found that the biobased colourants demanded a methodological shift in my practice, and opened expressive possibilities through costume. Observing how the prolonged immersion of fibres into the dye-baths affected the colour outcome, I was not only baffled by the results, but I found this interesting from a methodological perspective: the amount of time needed for each dyeing experiment also demanded me to rethink how I approach material engagement through my work. Especially emphasised was the need to challenge my expectations of time allocated to the experiments; from previous experience with commercially available synthetic colourants I was used to a faster pace, with shorter timespan between a colour idea and the possibility to test and evaluate it in the rehearsal environment. The biobased colourants demanded me to shift my approach, allocating time, attention and focus on each material and how to work *with* it. The resulting possibility of colours that opened up through this approach was inspiring as costume designer.

I found that opening up the biobased material explorations and thinking to the team of collaborators can be of value, both for the costume designer and for the performance making collective. In this process I articulated my interests in biobased dyes in relation to the theory and our analysis of posthuman philosophy, and reasoned my choice to incorporate chaga as colourant for the costumes. However, the dyes were not incorporated further into the collective exploration of the team. I think there is a creative potential to be discovered by opening up this process even more, and this is something I developed in the following projects.

Feedback from the collaborators supports this notion of value resulting from opening up and sharing of the material research and thinking through costume in future works. The following quotes are selected from collaborator feedback:

"I appreciated the sustainable and less-toxic approach in the design as a performer wearing the costumes daily but also as a fellow artist searching alternative, more sustainable ways to make art. I don't think the bio-based materials consciously affected my performance but wearing them felt natural and easy and it was important for me to hear these facts and reasons behind the decisions from the costume designer."

"The idea of extending your body through costumes and different organisms or living things as a co-performer really interests me, especially from the co-creating point of view."

"As a performer I found it really interesting and I could clearly see the link to the overall topic."

"I noticed that I valued the material more than any common garment."

"I remember when I first saw the different color-samples and textures in the rehearsals. It allowed me to start to imagine what my character would be like."

"I would like to support sustainable materials in my own work in the future. I think it is important that we consider questions of sustainability in all areas of our lives, also in art."

### **5.1.5 Questions to Consider for Further Inquiry in the Next Iteration**

Each of the productions I worked with concluded with a set of questions for future consideration. *Posthuman* (2016) triggered the following questions:

- Can other colourants be employed through extended immersion in the dye-baths, and what kind of colour variations could be achieved in this way?
- How can microalgae be explored further as colourants in costume?
- How can different combinations of biobased colourants and techniques such as overcolouring affect the outcome?
- Can the washing fastness of the biobased dyes and pigments be improved without chemical mordants, and how?
- How can the biobased material explorations be shared with the artistic team through the performance making process?
- How can the conceptual thinking through biobased costume material be articulated further?

These questions were taken further into the work on *a life - nomadic melodrama* (2017).



## 5.2 Set-up of Production 2: *a life - nomadic melodrama* (2017)

*A life is everywhere, in all the moments that a given living subject goes through and that are measured by given lived objects: an immanent life carrying with it the events or singularities that are merely actualized in subjects and objects.*

- Gilles Deleuze



Figure 8 Performance documentation photo. Customised trousers in linen fabric dyed with berries; top in silk fabric dyed with algae; headwear of reindeerskin/fur, silk fabric treated with acrylic medium, reindeer hair, algae pigments; anoraks in silk fabric treated with acrylic medium, reindeer hair, algae pigments, net fabric. Photo by Sanni Siira.

*The indefinite life does not itself have moments, close as they may be one to another, but only between-times, between-moments; it doesn't just come about or come after but offers the immensity of an empty time where one sees the event yet to come already happened, in the absolute of an immediate consciousness.*  
- Gilles Deleuze



Figure 9 Performance documentation photo.

### 5.2.1 Interests & aims - Team

*a life - nomadic melodrama* was a university production and the main artistic thesis work of myself and the choreographer. Participating students were from the study programmes of costume design and scenography at Aalto University, and choreography, dance, lighting design and sound design at the Theatre Academy. In addition, one professional performer (an actor) was contracted into the team. The production was presented with performances at the Aalto Studios' Kallio Stage in Pengerkatu, Helsinki in November 2017.

*a life - nomadic melodrama* was initiated by the choreographer who gathered several of the artists from *Posthuman* to collaborate again on this production. This project continued the exploration of philosophical theory established in the previous work, and the development of methods for doing this through performance making. A formative source was political theorist Jane Bennett's publication *Vibrant Matter* (2010), in which her articulations on *assemblages* (2010: 20-38) were particularly inspiring for exploring composition and human-non-human materials and agency in rehearsals. Bennett understands *assemblage* through Deleuze and Guattari, and as constituting of "ad hoc groupings of diverse elements, of vibrant material of all sorts" (Bennett 2010: 23) the elements of which include "humans and their (social, legal, linguistic) constructions, also include some very active and powerful nonhumans. electrons, trees, wind, fire, electromagnetic fields" (Bennett 2010: 24). Thus, our work with the concept assemblage evolved from *Posthuman*.

The concept of a nomadic subject and nomadic thinking (Braidotti 2011, 2014) was an influential point of reference for the shared creative process. According to Braidotti, the nomadic subject is "*a cartographic tool that helps us compose materialistic mappings of situated, i.e. embedded and embodied, social positions in an age of global hybridity*" (2014). To unwrap what these could mean and contribute with as part of our performance we read, analysed and discussed throughout the rehearsal period, and explored through methods such as translation<sup>4</sup> (von Bagh 2018).

### 5.2.2 Interests and Aims - Costume Designer

The costume idea evolved with *nomadic* as main inspiration, and I was interested in referencing and playing with nomadic as in Braidotti's nomadic subject and very concretely as being in movement, as a flow of people and as a way of life in human cultures.

I studied perception theory and researched the biophilia hypothesis, according to which "humans have an evolutionarily based affinity for nature and an innate need to affiliate with life and lifelike processes" (Hes and Du Plessis 2015: 45, Klockars et.al. 2019). I found this interesting in the context of this piece, especially as a response to the title 'a life'. I was interested in exploring a world-logic according to the biophilia hypothesis and to do this through costumes by applying biobased colourants. Would these colourants from nature be perceived more favourably? And if the colours were from nurturing sources, would they have a nurturing effect on the person experiencing it in the live performance? Motivated by my experience on *Posthuman* I was keen to continue to research biobased colourants, and explore what else I could find by engaging with these through costume.

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<sup>4</sup> von Bagh understands translation as "a possible praxis in looking at the connection between the theory and practice, also the juxtaposition of lingual semantic levels and bodily methodology. It is a notion about an elaboration of a process which combines theme-wise structured framings and choreographic bodily research." (von Bagh 2018: 18-19).

To support a sense of lightness and ridiculousness through costume I decided to play with the idea of protective costume that is actually quite useless and never quite ready: anorak-like garments put on to protect from climate and wind, but the lower arms and feet of the body remains exposed. During the performance the amount of exposed skin on the performers would change. The costume design explored subtle and sensitive distortions of quite simple shapes, recognisable garments and silhouettes; a hang-out, relaxed and soft. I combined the use of costume garments made from scratch with existing garments from the wardrobe storage, the latter customised to according to the needs of my designs. The fabrics were a selection of silk-, linen-, and cotton fibre fabrics, as well as some unidentified mesh fabric. I chose to use both protein based and cellulosic fibres so that I could explore how the biobased colourants would attach to a wider range of materials, and to study how these variations could impact the costume design as well as the performance aesthetics.

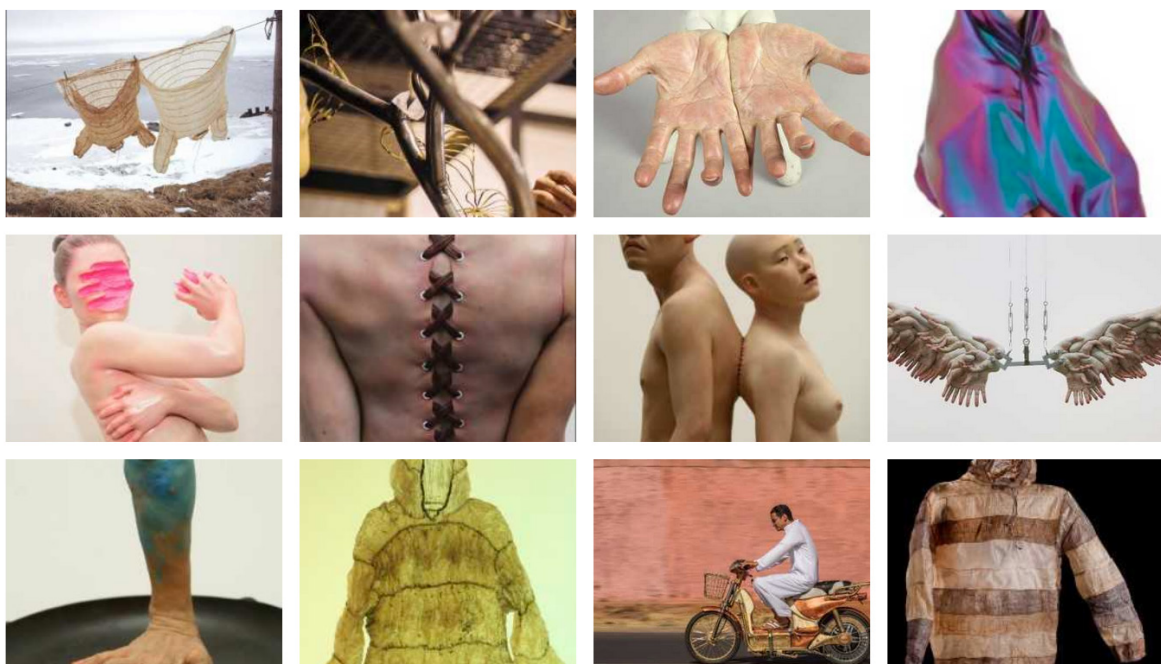


Figure 10 My main inspiration images for *a life - nomadic melodrama*. Credits from top left corner: Photograph *Gut parkas hanging in the Breeze at Mekoryak, 1964* by Steve McCutcheon; Unidentified, image retrieved online; Details from the sculptures *THE ISLET OF ASPBERGER TYPE-VI, THE VAIL, MATURED MATRIAL PINK, CONDITION FOR ORDINARY\_COLONIZATION, THE ONE, THE WING*, Untitled object by Choi Xooang; Chukchi seal gut parka in Anadyr City Museum; DIY Electrical bike, image retrieved online, source not identified; Rain parka of bear intestines made by Helen Dick, Alaska (2008).

### 5.2.3 Aims and Method - Biobased Materials

I decided to build on the experiences with biobased colourants in *Posthuman*, through further experiments with a wider selection of colourants, and also consider what these colour processes might mean beyond the technicalities as materials incorporated more into the shared process of performance making. I hoped to solve some of the issues on washing fastness I encountered on *Posthuman*.

I was keen to continue exploring the less-toxic alternatives to attach colour and fabric, and to explore how the quality of (un)stability of the colourants could inform the process and

the stage environment. As the costume material experiments progressed I frequently brought samples into the rehearsal space. This was a way to share the textures, colours, materials with my colleagues, and to test scale and how the samples would be perceived in the lights and environment on the stage.

The use of microorganisms as colourants appealed to me in the context of *a life*: these organisms are ancient inhabitants of planet Earth, and fundamental to the development of life on this planet. I imagined my stage-creatures would rely on these microorganisms for food. I searched the local health food supplier for microorganism superfoods that I could explore as potential colourants, and I found chlorella and spirulina. I also found berries. As edible and nurturing raw materials, I thought this would be a good combination for my costumes.

I chose to continue with the direct dyeing technique explored in *Posthuman*, as I was keen to explore how the protocol could be applied to these other colourants and fibres. I was particularly interested in the use of extended immersion times, and how this might affect the colour results. I explored the selected materials with variations of the dyeing protocol, including the ratio between fabric weight and colourant, pre- and post-dye treatment of the fabric, drying procedures and washing temperature.

The colourants were green microalgae *Chlorella vulgaris*, cyanobacteria *Arthrospira platensis*, acai berries *Euterpe oleracea* and blueberries *Vaccinium myrtillus*. The main fibres of study were silk, linen and reindeer fur, which were also used as costumes in the performance. In addition, I dyed a net fabric (fiber composition unknown) which was made into a costume garment.

For the direct dyeing I prepared the dye-bath by boiling the colourants for approximately one hour, followed by an immersion of the fibres to be dyed. The immersion time varied, between a few hours to 14 days. I used assistants such as vinegar and sodium sulfate.

I also chose to explore techniques for applying microalgae and cyanobacteria as pigments onto the selected fabrics, with the aid of acrylic medium and application techniques including brushing, dripping/pouring, sprinkle as dry powder and blotting with paper.



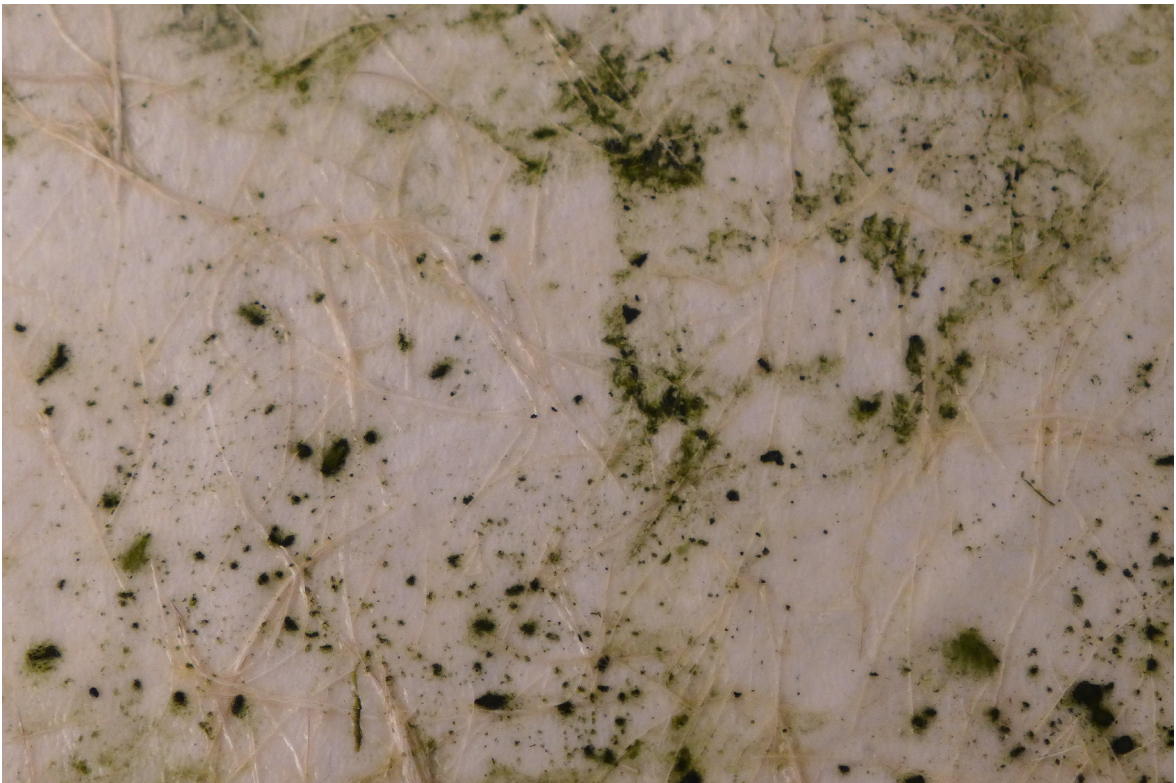
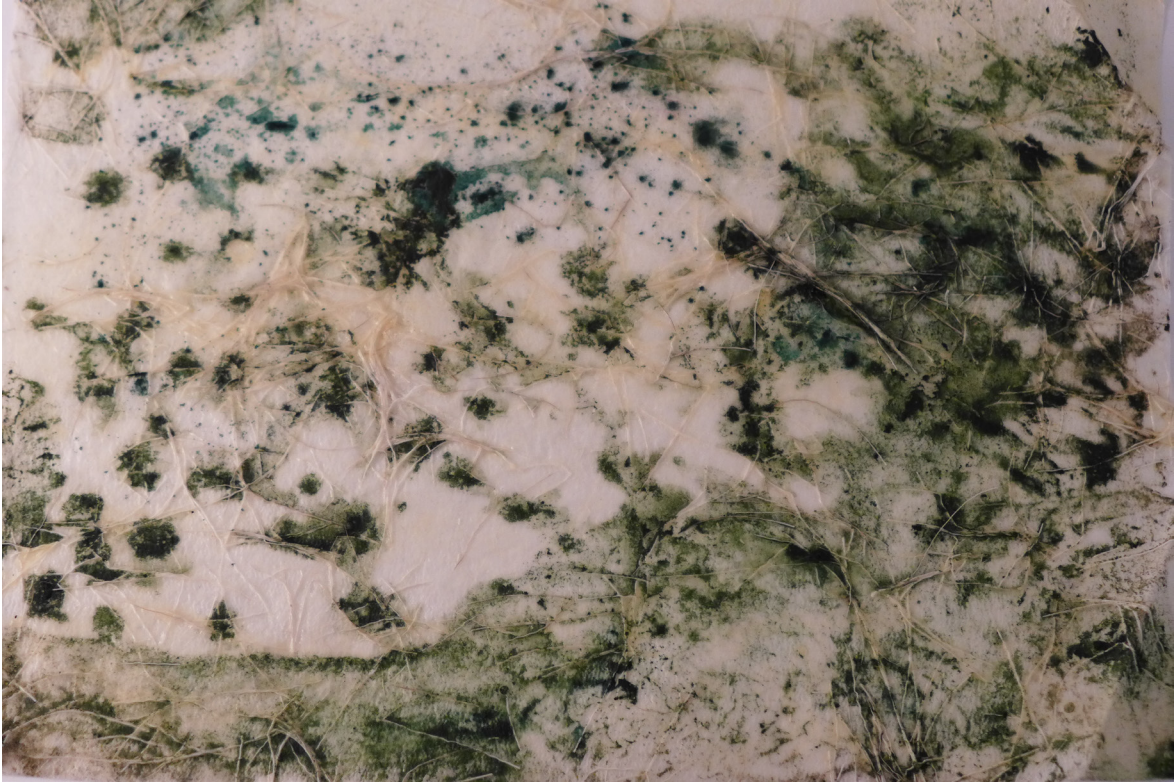


Figure 11 Dyeing workshop documentation. Colourant: spirulina and chlorella. Silk fabric, acrylic medium, reindeer hair.



Figure 12 Samples in rehearsals. A selection of colour samples and material explorations. Colourants: acai berries, chlorella, spirulina. The acai samples have been immersed in the dyebath for up to 14 days,



Figure 13 Samples in rehearsals. Colourants: chlorella and spirulina, against the spirulinapainted stage floor, in stage lights.



Figure 14 Performance documentation photo. This image shows colour variations due to the interaction of materials: sweat, heat, stains from floor algae. Colourants: spirulina, chlorella, acai, blueberry. Photos by Sanni Siira.



Figure 15 Performance documentation photo. The costumes are dyed with acai berries, blueberries, and chlorella. The costumes are not yet very stained from use, and material interactions onstage. Photo by Sanni Siira.



Figure 16 Post-performance documentation photo. The costume garments are stained and marked by the wearing body, movements and interactions with the microalgae on floor surface.

#### 5.2.4 Key Findings from *a life - nomadic melodrama*

I found that when I made more efforts to open up my material explorations with the team, through a more dynamic relationship between my studio process as costume designer and the rehearsal process as shared by the team, then the material ownership became distributed more broadly amongst the working group. By this I mean that the material research seemed to be related to and engaged by my collaborators more on their own terms, aligning it in relation to their own field of practice.

The ownership that my collaborators took fed back into my practice as costume designer, informing my process and relation with the biobased materials. This was noticeable for me in *a life - nomadic melodrama* when the set designer proposed to explore how the microalgae could work as colourant onto the stage floor surface. This directly impacted on how the costume designs then evolved, e.g. in terms of finalising the costume colour choices in relation to the floor colour, and in terms of how the costumes transformed during the live performance.

For me, a sense of material interaction, agency and space for ‘being together’ was strongly present. This was my second finding here. When the costumed performers worked on and with the microalgae painted floor surface, some algae rubbed off from the floor onto the performers, marking their costumed bodies. This changed the appearance of the costumes during rehearsals, but also during each performance and throughout the performance run; the costume became an archive of traces from the bodies, movements, and material encounters in this performance environment. This interaction, between floor materiality and costumed moving bodies, became part of the performance aesthetic, working also the other way: bodies, movements, sweat and water subtly changing the patterning and appearance of the microalgae surface, footprints emerging and dissolving again. The microalgae were, in a way, co-performing on the stage, working with, and alongside, the performers. I have not had this kind of experience with synthetic dyes or scenic paints.

I found that the longer immersion time during the dyeing process seemed to add more saturated colours to the fabrics, so that there was more colour remaining also after the first and second washes. This meant that the washing needs of this specific production could be met without the need to re-dye the costumes during the performance run. The challenge of better washing fastness was not resolved. However, when the immersion time of the dyeing process was extended for up to two weeks, this had implications for the progression of the costume design in the shared rehearsal context. I noticed that it became challenging for me to balance the requirements of the material research in the dyeing workshop inside the limited timeframe of the rehearsal period.

Through this production I found *perception* as increasingly relevant to observe when working with biobased materials; as a part of the live performance experience, but also as a tool during the performance-making and costume design process. Therefore, my process as costume designer was informed and affected by my perceived experiences and observations: through sight, through tacit handling and making, and through the different scents released by the biobased colourants. Examples of the latter include the pleasant scent released by the berries during the dye-bath preparations, and how the post-rehearsal smell of a microalgae-dyed costume garment (at this stage warm from wear) was described as a "funky surprise" by the performer working with it. As costume designer, I can incorporate suggestions for such perceived experiences and affects into my work, e.g. as

sensory information revealed to the performers through their engagement with the costume material.

To me, the biobased colours seemed to appear with richness and depth onstage. The biodyed surfaces seemed to have a capacity for high sensitivity to changes in the stage lighting: small shifts which made the colours seem alive and evolving to me. It is possible that my colour perception was biased because of my research interest, however, my feeling was that the colours were activated differently from what I am used to with synthetic dyes.

#### **5.2.5 Questions to Consider for Further Inquiry in the Next Iteration**

- How can the structure of performance making be organised differently, in such a way that it allows the costume designer more time and focus for material experimentation, and to study and learn from this material?
- How can material production systems inform and support the material practice of the costume designer?
- In what ways can the material's performative quality, or activeness as onstage presence, be explored further in the performance-making process and understood as component of the performance?
- How can the biobased materials in the context of live performance inform the perceived experience and affect of an audience?
- How can the costume materiality, i.e. the costume thinking through biobased material research, be shared outside the working group as part of the practice, e.g. with the performance audience?

These questions were taken further in the work on *Posthuman Days* (2018).



### 5.3 Set-up of Production 3: *Posthuman days* (2018)

*Our bodies, ourselves; bodies are maps of power and identity.(...) A cyborg body is not innocent; it was not born in a garden; it does not seek unitary identity and so generate antagonistic dualisms without end (or until the world ends); it takes irony for granted. One is too few, and two is only one possibility. Intense pleasure in skill, machine skill, ceases to be a sin, but an aspect of embodiment.*

- Donna Haraway



Figure 17 Performance documentation photo.



*We require regeneration, not rebirth, and the possibilities for our reconstitution include the utopian dream of hope for a monstrous world without gender.*  
- Donna Haraway



Figure 18 Performance documentation photo. Photo by Katri Naukkarinen.

### 5.3.1 Interests and Aims - Team

The third and final artistic project that informed this thesis, *Posthuman days*, was developed as a coproduction between Zodiak - Centre for New Dance in Helsinki and choreographer Jenni-Elina von Bagh. The performance was presented at Zodiak Stage in November 2018.

Several of the collaborators of this project had worked together on the previous productions, either *Posthuman* or *a life - nomadic melodrama*, or both, but as a whole working group this was a new constellation of artists. *Posthuman days* was initiated by the choreographer during the working process of *Posthuman* two years earlier and there was a clear topical connection between the two productions. The shared interest and starting points for the performance-making process, or praxis, was similar to the previous works, i.e. engaging with a topical feminist and new materialist philosophical discourse, and exploring how to work with this in the stage situation through tools such as translation and as co-resonance (von Bagh 2018a; 2018b).

The core research questions of *Posthuman days* were: What is a posthuman subject? What does it mean to let go of anthropocentrism? The world is breaking before our very eyes, but what is this inevitable state of change?

The theoretical material for reading, speculation and discussion was, again, located in feminist and new materialist philosophy, with key references including a return to Braidotti's *The Posthuman* (2013) and the addition of feminist thinker and historian of science Donna Haraway's 1985 essay *The Cyborg Manifesto*. References to sci-fi and popular culture were explored, including the films *Blade Runner* (1982) and *2001 A Space Odyssey* (1968). The final performance included excerpts through dialogue from these films, intertwined with fragments of text evolved through the rehearsal period. The choreographer was interested in exploring "the co-resonance between philosophy and stage. How to surrender for the paradox of posthumanism? How would a performers body meet the strange and unknown in its relativity and connectivity to the surrounding?"(von Bagh 2019)

### 5.3.2 Interests and Aims - Costume Designer

Between *a life - nomadic melodrama* and *Posthuman days* I had attended courses, conferences, and events with focus on biomaterials and on sustainability thus I meanwhile developed my own skills and thinking related to such materials. I was keen to try out what this might mean in my own field of practice, especially how nanocellulose and other cellulose-based biomaterials might be used in costume design.

Encountering samples of flexible and weirdly skin-like semi-dry microbial cellulose triggered my curiosity to explore this material further in connection to the human body and as potential costume material. I thought microbial cellulose material would be an interesting conceptual choice in the context of *Posthuman days*: could the core research questions of this production be translated into costumes and costume material through microbial cellulose, and how? As an extension of assemblage and cyborg thinking: could these cellulose-producing microbes be explored as biomaterial collaborators through the costume design, and how? How could this material choice support a world-logic where the costume materiality is entangled with the biological history on this planet, as presence evolving through time?

I also felt that the framing of *collaboration* with these non-human creatures allowed for a different perspective, entrance point, for engaging with the materiality of costume - and in its extension the material agency of a performance situation. In relation to *Posthuman days*, I hoped this biobased material concept could provoke some interesting thoughts and discussions for the shared process, and potentially expand the production's discourse on stage representation and non-human performance.

### **5.3.3 Aims and Method - Biobased Materials**

As costume designer and in relation to my thesis research, the microbial cellulose offered an opportunity to radically expand my explorations and understanding of biobased material in costume practice. I was therefore keen to study and explore this further, focusing on a new biobased material and the process of developing it.

In order to understand how the microbial cellulose could be engaged with as material in costume design I needed to learn about the technical issues involved in the cultivation of microbial cellulose, the post-cultivation processing stage/-s, as well as the properties and qualities it would reveal at different stages of wetness/dryness. In order to understand how this material could interact with the human body as costume, it was necessary to do experiments on my own body to prepare for the explorations with the moving bodies of the performers, and to spend sufficient time with the material explorations in rehearsals throughout the design process.

I was fascinated by the perceptive qualities of the semi-dry and wet cellulose, and considering the findings from *a life - nomadic melodrama* I wanted to explore how this material could contribute to a richer stage aesthetic of the performance, as well as affect the audience's experience of the live performance.

I introduced the concept of the microbial cellulose as costume material to the creative team early in the process, and we decided to go forward with material trials and explorations during the rehearsal process. These shared explorations fed back into my work in the laboratory and design studio.

Microbial cellulose was an unfamiliar material for me. I found no references on this material used as costume in contemporary dance. Related examples of its applied use with human body was as material in one performance art piece (Pevere 2018), in fashion showcase garments (Lee 2011), and as healing membranes on skin burns i.e. medical applications. I also found interesting examples of research on bacterial cellulose grown onto fibres. During the summer months, in-between the initial material introduction to the team and the beginning of the rehearsal period, I researched the material and its use in related fields more in-depth, paying particular attention to any information on the technical aspects and nuances of difference and similarity in the development and use. I consulted with chemists and other experts researching microbial cellulose at Aalto University. I set up a cultivation station for my microbes in the ChemArts laboratory, and began cultivating and exploring this material as potential costume material.

My cultivation station setup in the laboratory allowed me to study the technicalities of cultivating microbial cellulose, as well as explore the qualities of the material and if this would differ, and how, depending on the cultivating medium. I conducted preliminary experiments in the design atelier and on my own body; this provided useful information for

me to better understand how to work with the material as costume material, and to prepare for working with the microbial cellulose in the rehearsal context.

The cultivation station consisted of five larger growing containers, as well as several smaller containers for developing smaller samples. My setup was not in a completely controlled environment, however it was sufficiently stable for my purposes. Drawing on published material available from related use in the fields of fine arts, fashion design, product design and medical industries, I prepared five variations of cultivation medium for two different cultures of cellulose-producing microbes. These were cultivated in larger containers. Additional experiments, such as cultivating cellulose onto textile surfaces and cultivating for colour variations, were set up in the small containers. I monitored the developments in each container, and harvested the cellulose sheets when I considered them suitable for my purposes.

Two kinds of microbial cultures were used: kombuca culture (4 batches) and *Glucoacetobacter xylinus* (1 batch). Each batch was cultivated using a different recipe.

The microbes in the cultivation mediums would continue to produce new cellulose sheets after the harvests. I fed the microbes more cultivation medium at regular intervals, occasionally adjusting the recipes for slightly different cellulose qualities. The harvested cellulose was rinsed then soaked in alcohol solution to kill any remaining bacteria



Figure 19 Microbial cellulose cultivation. First version and second version of my cultivation station. The photos show the cultivation stations with and without black covering. The main difference between the two setups was the air extraction funnel/hood connected to the second version, shown here with black plastic covering.



Figure 20 Microbial cellulose cultivation. Upper image: Disinfecting the custom made, breathable lids for the containers, photo by Alvar Salminen Fossheim. Lower image: a smelly *G. xylinus* is transferred from laboratory storage container into the cultivation medium with the aid of my assistant.



Figure 21 Microbial cellulose cultivation. The photographs document thickness of the wet microbial cellulose, and its appearance just before and just after harvest and disinfection, after approximately five weeks of cultivation.

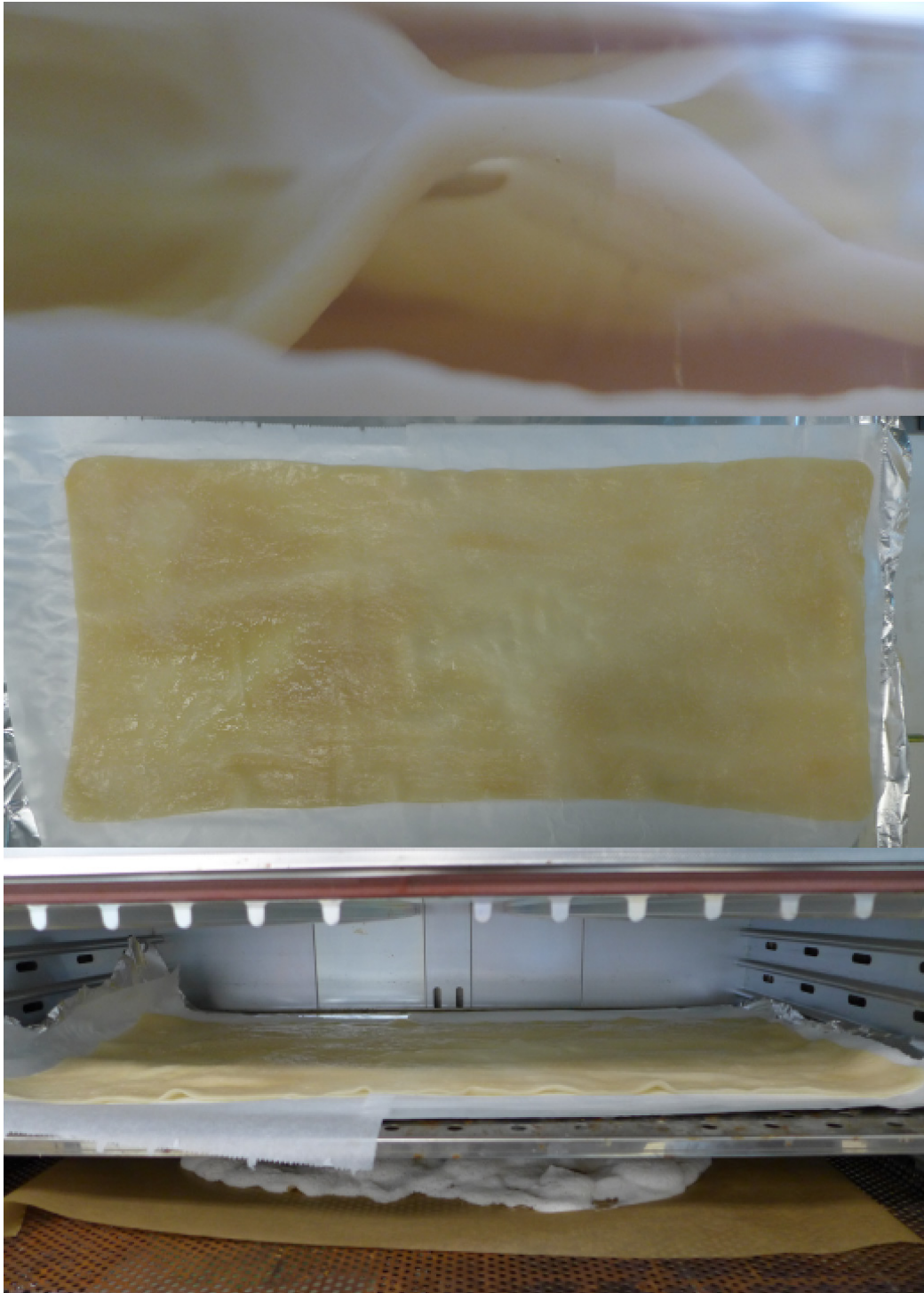


Figure 22 Microbial cellulose cultivation. Microbial cellulose material in cultivation medium, in process of air drying, in process of oven drying.



Figure 23 Microbial cellulose and the costume designer's hand. The aim of this initial exploration was to study how the thinner sheet of wet microbial cellulose material behaves and appears in interaction with articulated parts of the human body.





Figure 24 Microbial cellulose and the costume designer's hand. The aim of this initial exploration was to study how the thicker sheet of wet microbial cellulose material behaves and appears in interaction with articulated parts of the human body.

The different cultivation mediums recipes seemed to encourage slightly different growth of microbial cellulose; the cellulose sheets differentiated in colour, texture, and thickness. Working with living organisms however, I consider it likely that other factors, such as temperature and air moisture, affected the growing process and the outcome. I did not measure the acidity/pH levels of the cultivation medium and how this changed during the fermentation process - perhaps a regular monitoring of this and the growth rate could provide information on the relation between the two.

I experimented with the cellulose sheets on my own body, exploring qualities of material movement, tensile strength, appearance and feel at different stages of dryness/wetness. I explored shapes, and ways of attaching and connecting the material to my body. I made prototypes of selected attachments connecting the material with other materials, and to itself. I did similar studies with semi-wet/semi-dry cellulose sheets, with dry cellulose, and with re-wetted dried cellulose. In this way, data concerning the cellulose qualities was collected through a sensory hands-on and experimental practice. It was useful for me to learn about the sensorial experience of interactions between microbial cellulose and the human body; including how different thicknesses and weights of microbial cellulose behaves and feels, its folding capacity, movement qualities, feeling of gravity and texture.

Based on the findings from my initial atelier and laboratory studies, I was particularly interested in observing how semi-dry/semi-wet cellulose would be affected by being placed in direct contact with the increasingly warm and sweaty bodies of dancers at work. My atelier experiments suggested that the semi-dry/semi-wet cellulose would soften, become more flexible and stronger. Could this be a costume quality to work with? Would there be noticeable changes which, as costume in a performance situation, could be utilised as indicator of time and as material quality in itself? As well as supporting the durability of the costume? I was also curious to study how the wet cellulose would perform with the moving bodies. How would it affect the performers? How they would collaborate and respond with the material?

In the atelier experimentations I had identified potential challenges to solve: how to shape and attach the material with itself and to the performers' dancing bodies, and preventing contamination of the cellulose? A major challenge was the durability of the material: how would it take the stresses of performance making? As material collaborator it would very likely get rough treatment in the rehearsals. For this reason, my early visions of larger-scale microbial cellulose costumes needed revision - it would simply not be possible within the resources available.

Based on my trials and observations, I prepared how to introduce better the sample material to *Posthuman days*: to the performers and to the other collaborating artists. In agreement with the choreographer we decided to approach the cellulose material as material in itself, and give space for the material to inform the work in rehearsals. The material development and costume design process thus evolved through allowing feedback between the rehearsal trials and my laboratory and atelier work. In this way the creative ownership of the microbial cellulose was distributed between the collaborating artists, and the bio based material embedded into the shared performance making process.



Figure 25 Rehearsal documentation photo. Semi-dry/semi-wet microbial cellulose was brought into rehearsals, for material trials in the real 1-to-1 scale and in the real context of the performance making environment.



Figure 26 Rehearsal documentation photo. Performers, wet microbial cellulose and other objects interact.

During the rehearsal, the interactions between the material and the performers brought up the potential demands on the microbial cellulose: withstanding stress etc. The first round of cultivating microbial cellulose showed a variety of results: some cellulose sheets were thick and heavy, others thin and more fragile. There was a significant amount of wear and tear on the microbial cellulose material during the rehearsal process. The microbial cellulose disintegrated, fell apart, ripped as result of the usage onstage and the frequent handling. The thinnest sheets of microbial cellulose sheets would dry out during the rehearsals, forming thin crust-like layers on top of the skin surface. I thought this was an interesting material transformation. However, it meant the amount of microbial cellulose would reduce in quantity each time we worked with it.

The lack of predictability, or degree of outcome unpredictability at the cultivation stage made me hesitant to incorporate larger quantities of microbial cellulose into the costume designs. Although the cultivation process was ongoing throughout the rehearsal process, I did not find it sufficiently reliable and predictable to commit to larger quantities of microbial cellulose into the costumes designs for the performance. I considered the potential risk of not having sufficient material for all the performances too high.

A method for cellulose maintenance needed to be developed. Cellulose is considered the most abundant organic compound on the planet so there are plenty of organisms that have specialised in breaking it down for nutrients etc, and thus it is highly susceptible for contamination. Once I had figured out a way to reduce the risk of mould and other unwanted organisms growing or eating the cellulose, a routine for cleaning and storage between use was established.

For me the colour changes, assumed to be due to bacterial pigmentation, added another layer of detail, which made the material slightly more complex to observe in the stage context. Adding small dots or spots of colour to a surface is a common technique to achieve a more complex and rich visual experience of onstage surfaces, and I thought the dots produced by microbes were nicely commenting on this. Dotting/spotting a costume fabric with microbial pigments could be an interesting technique to develop for future work. These microbial pigments could be approached as visually connecting the materiality of the costume and the materiality of the performer's skin, which also has some darker coloured dots on it as part of its natural pigmentation. For me, this was a nice connector between the costume materiality on *Posthuman days* and *Posthuman*.



Figure 27 Rehearsal documentation photo. Sequence from first improvisations with semi-dry microbial cellulose. Exploring the material collectively opened up for unexpected and surprising findings, such as the transformative potential of semidry microbial cellulose, as seen in this sequence: its shape is changed from a flat sheet to a small ball (and later, back into the sheet-shape).

Working with the material through rehearsals allowed me to observe the interactions between microbial cellulose in its different stages of dryness/wetness, the performers, and the choreographic expression. These improvised sessions were sometimes structured around a task, with specific aspects of the materials such as a technical solution for attachment, or as more free explorations on how the microbial cellulose can interact with the performers onstage.

During the first improvisation with semi-dry microbial cellulose, one of the performers transformed a sheet of microbial cellulose into a ball, or clump, small enough to fit in her hand. She then passed this to her other hand, and dropped it to the floor. It made a splat-like sound when the cellulose hit the ground, surprisingly heavy. For me this simple transformation of the shape of the material was totally unforeseen, I had not tried this action beforehand in the studio. It made a significant impact on me, and my thinking about the transformative potential and flexibility of the semi-dry cellulose.

Other unexpected uses of microbial cellulose by the dancers included how they related and interacted with the cellulose as material placed on their bodies, between their bodies, and as object in the performance space.

The wet microbial cellulose was not an easy material to attach on, or to, the performers' bodies. The material would tear and fall apart, but not necessarily from the manipulations where I expected it to. A variety of attachment methods was explored, and the most functional for the context of *Posthuman days* were to clip the cellulose to itself with metal clips adapted from braces, strap it onto the body with elastic ribbons, and utilising the natural stickiness of the material to 'glue' it onto the performers' skin as well as layering the cellulose onto itself. These techniques became our repertoire of attachment methods. Throughout the rehearsal process ways to use these attachment methods to place the wet microbial cellulose materials onto the body was explored, and sometimes included the whole performance making team, e.g. the performers, the choreographer and the sound designer. I wanted to keep a sense of lightness in the approach and work with this demanding costume material, and one way to achieve this was to open up for shared material explorations, rather than me providing a clear instruction for how to use the microbial cellulose. Through this approach, I hoped to distribute a sense of ownership of the material within the team, encouraging confidence and trust in the process of material explorations through costume.

The semi-dry cellulose was more receptive to conventional attachment methods, as long as there was sufficient flexibility for the material to move, preventing it from tearing. Attachment solutions explored in rehearsals included rubber straps with metal buckles, elastic ribbon, gaffa tape, medical stockings and clips.

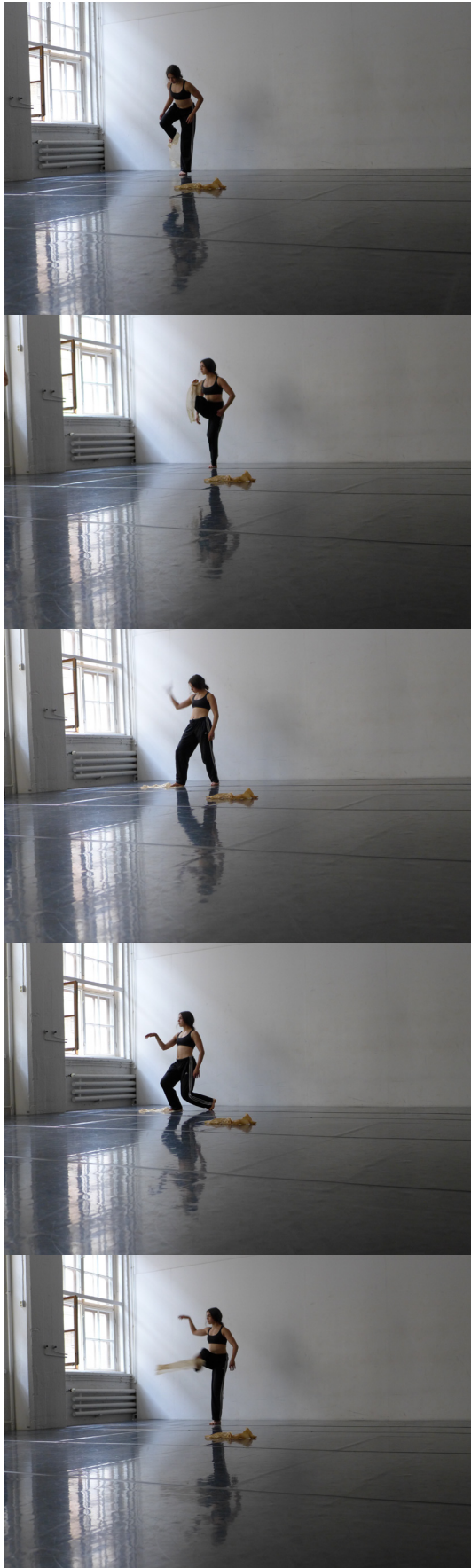


Figure 28 Rehearsal documentation photo. Sequence with semi-dry microbial cellulose interactions during first rehearsal. The microbial cellulose was brought to rehearsals as costume material, and from early on it was clear that it needed to be present onstage first and foremost as itself, as material with specific qualities, provocations, agencies.





Figure 29 Rehearsal documentation photo. Sequence with interactions between two performers, wet and semi-dry microbial cellulose, attachments, movements of bodies, and movements of cellulose material. The microbial cellulose needed to endure the dynamic energies and movements frequently present in the rehearsals.



Figure 30 Rehearsal documentation photos. Wet microbial cellulose placement and attachment variations: metal clips, draped and ripped thick microbial cellulose, 'glued' and layered thin microbial cellulose.

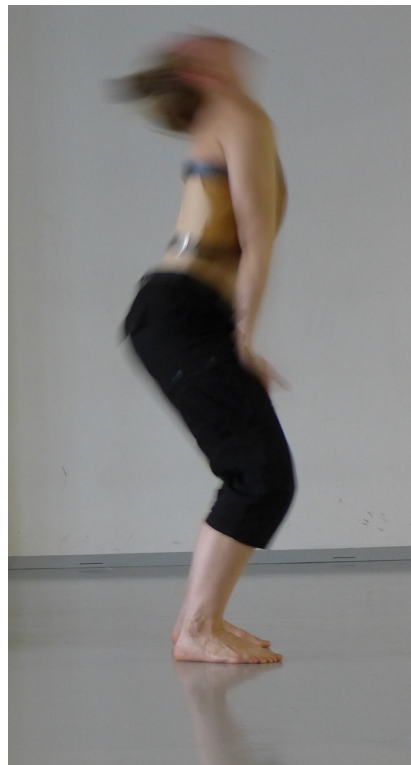
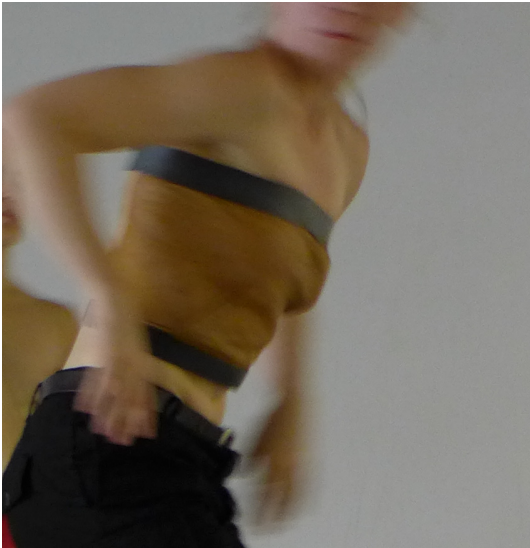


Figure 31 Rehearsal documentation photo. Semi-dry microbial cellulose attached with rubber bands, open back for ease of movement and strain on the material. During use the semi-dry microbial cellulose seemed to soften and get stronger.



Figure 32 Performance costume documentation photo. On these images, darker coloured dots can be seen on the microbial cellulose. These dots are probably pigments produced by other microbes. The photos also show the patent we arrived at for securing the microbial cellulose to the performer's body: elastic bands with plastic buckles. The moisture of the cellulose provided a certain stickiness which helped "glueing" the material to the skin/body.



Figure 33 Microbial cellulose in the onstage container. These cellulose bits are a combination of cellulose used for two months in rehearsals, cellulose used for a few days, cellulose that has been kept moist throughout, and cellulose that has been dried and re-wetted.

The image above shows the variety in colours, texture, and thickness of the microbial cellulose towards the end of the performance run. During this time pigmentation and colour changes has occurred, probably due to other microbes such as pigment producing bacteria. The microbial cellulose that appears to have small bubble-shaped holes has been dried and re-wetted. The most smooth and 'fresh' looking microbial cellulose had been introduced a few days earlier.

### 5.3.4 Key Findings from *Posthuman days*

I found that microbial cellulose is a powerful material to engage with as costume material; as temporal quality and stage presence. The microbial cellulose demanded a very different set of attentions and sensitivities from me as costume designer when compared to working with more commonly available fabrics. It was not a familiar material for me, so I needed to spend time with it; to study and observe, learning the material and learning from the material. During the improvisations, the heat and sweat of the performers' body affected the microbial cellulose: the microbial cellulose costume seemed to become more flexible and strong. This was, for me, a fascinating material quality to work with in costume, and something I would like to explore further. Interestingly, the wet microbial cellulose also changed in appearance during the rehearsal period, e.g. dots appeared (pigmentation caused by microbes?) and the colours and textures changed.

Secondly, I found that the quantity of cellulose material needed for experimentation and application was a challenge. There were limitations on the amount of material I was able to produce due to the size of the production space and the available timeframe and budget. I embraced the slowness of the production as part of my design process. The restrictions on available material became a practical consideration for the design development. It was, for example, not feasible to realise costume designs that would require large amounts of microbial cellulose material and/or replacements between each use. I communicated these considerations to the collaborators, and found that the heightened awareness of the material production process increased the perceived value of the material and how it was approached and related to in the rehearsal- and performance context.

I found that my methods for assimilating the biobased material into my costume practice worked more purposefully. By allocating a separate timeperiod for material development before the rehearsal process started, I had sufficient time to actually fabricate my own costume material and to do the necessary getting-to-know-it before introducing it into the rehearsal context. The shared material exploration through the rehearsal process worked better, and my impression is that a sense of ownership to the material was distributed within the team as a result of this practice.

I also found that bringing the microbial cellulose materials into the rehearsal process enabled me to develop my material understanding and the costume designs in a close 'material dialogue' with my colleagues and the emerging performance. Immediately when the material was worked with in the rehearsals, my collaborators found ways to engage with it that I had not foreseen. This continued throughout the process, and I brought a sense of surprise and freshness to the material study.

I was amazed to discover just how rich and powerful the microbial cellulose was when engaged as costume material, and how affective the experience of watching it on and with the human bodies was. The experiential relationship between the microbial cellulose costume and the wearer's body was also emphasised in the feedback from one of the performers:

"The material affected a lot on my moving and habitus, it created new patterns of movement, made me somehow slower and more careful but also more precise and aware of every movement in my body (especially since the attachments were not so firm in the beginning and the cellulose could have dropped at any moment)", "it made me feel like a warrior, or somehow strong! I felt it gave me self confidence, a character of some sort - that felt good."

I also found that my colleagues appreciated knowing more about my costume thinking. To quote an email from set designer Fabian Nyberg:

"I guess what supported me the most was your response to the philosophical themes of the work and the discussions it lead us to. (...) your approach to both new and old ways of sustainability is very inspiring. (..) And – maybe first and foremost – the sustainable approach to any material that you work with has become more important for me in the last couple of years. Thank you for that!" (Nyberg 2019)

### 5.3.5 Questions to Consider for Further Inquiry in the Next Iteration

- How can microbial cellulose be explored further in costume design context, e.g. through interaction with other materials, through manipulating shape during the cultivation, through earlier integration into the process, through longer experimentation to explore deeper its expressive and narrative potential, etc.?
- What kind of the potentials for costume can be found through material processes such as biofabrication, biodesign, synthetic biology?
- How can the transdisciplinarity of contemporary performance making and costume design be extended to include also material researchers and scientists?

These are questions I am interested to explore further in future work.

## 6 REFLECTION

In the overall process of working on this topic through these three different productions, for me, it was necessary to learn the character of the biobased materials before being able to understand how to work with these as costume material and as an integrated component of a performance. Working with the selected biobased materials, in particular the microbial cellulose, was challenging for me. The lack of familiarity, of material predictability and control provoked an aspect of precariousness to the costumes, which I did not feel entirely comfortable with as costume designer. The experience of designing with less controllable microbial cellulose material was some times stressful, however I found that it also demanded of me to open up more for a *working-with* and a deeper material 'listening'. This sensitivity was a great tool for me to develop. The material needed to perform in its own right.

First and foremost, for me, this thesis project has opened up for a deeper material thinking and practice. Engaging with microbes, and acknowledging these as a collaborative relation, in ways inspired by Braidotti, raised a different sensitivity about the human-non-human into the performance situation through costume, and I think this was exciting and fascinating to discover. For me, such a material approach offered an interesting pathway/perspective for observing what a costume does: concretely, by its material qualities and as costume culture, but also on a discursive level: shifting and provoking thoughts, ideas and debate.

If needing to learn the character of the biobased materials, I also needed to learn the character of the philosophical writings and discourses informing the work. In my own practice, I dealt with the philosophical texts and discourses similarly to a playtext: by doing a kind of break-down analysis identifying - or *speculating* - what is shifting and/or emerging, who are the agents and/or players (human and non-human), searching for clues on textures, atmospheres, and exits and entrances (of thought). This exercise helped me

access and unwrap some of the complex theoretical thinking, and to apply aspects of it into the design process. The task of asking: *what can this mean in terms of costume materiality?* was a helpful tool for me to bridge the costume design process and theoretical concepts, and to align my personal creative process as costume designer as a *reflection of the same search* which was going on through the collective performance making process.

Working with the philosophical theories as part of this research was both inspirational and challenging. The academic theoretical discourse/-s through philosophical themes/fields such as new materialism are diverse and with complexities beyond the scope of this thesis research to unravel. Through this thesis research it has not been an aim for me to explain or illustrate the complex concepts and theories, but rather, to apply and work with these philosophical starting points as fuel for creative praxis. For me as costume designer it is particularly meaningful to connect these philosophical concepts conceptually to the biobased material research.

As costume designer I have a possibility to open up my work with a larger audience, and my experience especially on *Posthuman days* encourages me to pursue this more actively as part of my future work. To invite the audience into my costume material thinking, I had written this short paragraph about the inclusion of microbial cellulose, which was included in the programme of this production:

"How to translate the core questions of this production into costumes and costume material? One response is bacterial cellulose. Studying the qualities of cellulose grown from microbes, the process of making *Posthuman days* includes research on how this alternative material may serve as a collaborator in the context of costume design for contemporary dance."

This information was referred to frequently in later conversations, in press reviews and in interviews. The performers reported how, after the performances, audience members would approach them and ask to touch the microbial cellulose material. To me, these responses suggest that there is an interest among those experiencing a performance to understand stage materiality beyond that of spectatorship: to physically connect their own bodies with the human-non-human bodies at work in the live performance context, and learning material through tacit handling and perception. It also suggests that there might be a potential for outreach in the field more broadly, if costume designers articulate and open up their costume thinking to their audience more frequently. The following excerpt from Kati Raatikainen's review in Liikekieli.com supports this notion:

"The feature in the piece most clearly inside its theoretical framework is the entity, that costume designer Ingvill Fossheim has grown out of kombucha mushroom and bacteria (if I understood correctly). It has been used to create the dancer Karoliina Kauhanen's top, and parts of it or other entities like it (I'm not entirely sure if it is one or several beings) have been placed in a see-through container on the stage. The presence and contact with human body of an organism that exists on the border of life and death is somehow in the core of the concept of post humanism. It brings to mind the cultivating of living tissue, creating life in laboratory conditions, questions about the future, and that, which comes after human kind, is concretely combined with the question about the survival of our species and the interweaving of technology and life. One of the highlights of my experience in the audience was



to get to feel the being in question with my hands after the performance."  
(Raatikainen 2018)

To reflect on what a responsible material practice might mean in any context, and to consider the least harmful options for material sourcing and development, is important. In all my experiments I worked with biobased materials that occur in nature as components of complex ecosystems and habitats. The chaga fungi was sourced in nature by a friend, as well as purchased from a health food supplier. Despite my efforts, I was not able to identify if the latter was harvested in a responsible manner, and it could be that I, by purchasing this product, contributed towards a practice causing harm to nature. The same applies to the berries and algae, which I also purchased from a health food supplier. This thesis research demanded me to re-think and critically reflect on my use (abuse?) of materials and natural resources through my practice as costume designer. Learning more about systems such as circular economy, where material resources are repurposed rather than wasted, has supported my understanding of material life cycles and provided a meaningful challenge to pursue also in future work.

Through this process it has become clearer to me how important it is to consider all stages of material life cycles in costume design, and how much there is to learn from other fields of transdisciplinary practices. The rise in creative and speculative collaborations with focus on biobased material research, suggests a fertile ground for new material practices also in contemporary costume design.

## **7 CONCLUSION**

### **7.1 Summary and What I Have Learned**

Costume matter matters. This thesis traces a developing artistic methodology based on costume materiality via material engagement. The first production may be seen as an introduction: gently shifting the orientation of the costume materiality towards a praxis that includes and gives focus to biobased materials, in this case the chaga fungi, in the costume design process via natural dyes. The most important finding for me on this first production was how much this biobased material inspired and fed my creative costume design process through conceptual thinking and actual making, as well as the confidence that this less conventional material approach could generate interesting and meaningful performance aesthetics through costume.

In the second production I went further with my explorations. I introduced other biobased colourants and, based on the findings of the first production, I adjusted the framing of my experimental dyeing and applied a more structured, procedural approach. I explored the biobased colourants as medium onto/with other material, and as elements of surface manipulation through pigmentation and texturing. Through this second production I further explored how I could increase the sharing of my material thinking/approach with my colleagues/artist collaborators, searching for ways to incorporate the biobased materials into the shared performance making in a meaningful way. The most important finding for me in this second production was the perceptual richness and complexity of colour and texture that these biobased colourants contributed with to the costume design process and the performance, and the necessity of allocating adequate time and resources for fundamental material research when incorporating biobased materials as part of a costume design process.

In the third production I moved from developing colourants and surface manipulations to the fabrication of the material itself: I fed and looked after/cared for symbiotic colonies of bacteria and yeast, and in return these living microorganisms produced cellulose material that I harvested and explored as costume material. Another significant aspect learnt through this production was the sharing of my exploration directly with my team: I embedded the costume material explorations into the shared performance making, and I articulated my research also to an audience outside the working group. The perhaps most important finding for me on this third production was the discovery of a vibrant transdisciplinary community of biomaterial researchers who were willing to generously share of their expertise and knowledge, significantly informing my understanding of and through biobased materials. I also found that the process of developing my costume material through biofabrication actualised ethical and critical issues which were interesting to consider in relation to the costumed human body in contemporary dance. For me such ethical issues included wondering where the borders are between acceptable and not so acceptable manipulations of other living organisms, such as microbes, in order to meet my needs.

## **7.2 Suggestions for Further Research**

Through this thesis research project I have explored biobased materials in contemporary costume practice, and I have presented my findings on how these material choices affected/influenced my understanding of costume materiality. I have presented benefits and challenges that arose from this research, and how this material engagement could be understood and have impact technically and practically in costume design situated in a live performance making process. This thesis suggests that biobased materials can not only be viable as material alternatives in costume practices, but also have the potential to generate interesting aesthetic and performative qualities to the materiality of a live performance when embedded into the shared process of performance making.

The conclusions I arrive at in this thesis are based on a limited number of examples. It would therefore be interesting to explore how my findings relate to other biobased materials, and in relation to further, expanded explorations with the biobased materials of my study, e.g. the microbial cellulose.

It would be relevant to explore how biobased materials developed through synthetic biology, e.g. with the aid of genome editing technology, could inform a costume design process, and in what ways such a material choice would bring ethical implications and critical discourse to the performance making process and to the live performance experience.

My research took place through a limited number of performance making processes, similar in the shared overall approach and methods. It would therefore be interesting to explore how my findings relate to other processes of performance making, such as a speculative and costume-led process, where the biobased materiality could be at the very centre of the research/in a prominent and central position.

For me, this thesis research has opened up new perspectives and tools, and expanded my understanding of the agency of costume through a biobased costume materiality. It has opened up for a deeper material thinking and practice, which I aim to explore further in the future.



## LIST OF FIGURES

Cover image by Ingvill Fossheim

16 Figure 1 The iterative cyclic web according to Smith and Dean (2009: 20)

18 Figure 2 Performance documentation photo. Chaga dyed silk fabric, synthetic wig, sourced boots, bodypack transmitter, plastic tube. Photo by Katri Naukkarinen.

21 Figure 3 My main inspiration image for *Posthuman*. These minerals are from *Hollow Earth*, a project by New Mineral Collective (Tanya Busse & Emilija Škarnulytė). The image is a screenshot of a photo on their webpage. Credit: New Mineral Collective.

22 Figure 4 Chaga fungi and birch tree. It is from this wood-like, blackened and rust-coloured outgrowth of the chaga that the material for strengthening chaga tea, and my colourants, is harvested. Photo by Rolv Hjelmstad.

23 Figure 5 Dyeing experiments with chaga. Colour results from 1hr immersion

23 Figure 6 Dyeing experiments with chaga. Colour results from 3 days of immersion.

24 Figure 7 Dyeing experiments with chaga. Colour results from 3 days of immersion. Both fabrics are silks. The texture on the upper fabric is caused by a synthetic substance I treated the material with before the dyeing. The texture on the lower fabric is due to the chaga colourant. The colouring and pigmentations was embraced as a feature of the designed costumes, emphasising folds and structure in the fabric. This sense of tracing, of handled material and time, added another layer of narrative to the costume garments.

28 Figure 8 Performance documentation photo. Customised trousers in linen fabric dyed with berries; top in silk fabric dyed with algae; headwear of reindeerskin/fur, silk fabric treated with acrylic medium, reindeer hair, algae pigments; anoraks in silk fabric treated with acrylic medium, reindeer hair, algae pigments, net fabric. Photo by Sanni Siira.

9 Figure 9 Performance documentation photo

31 Figure 10 My main inspiration images for *a life - nomadic melodrama*. Credits from top left corner: Photograph *Gut parkas hanging in the Breeze at Mekoryak, 1964* by Steve McCutcheon; Unidentified, image retrieved online; Details from the sculptures *THE ISLET OF ASPBERGER TYPE-VI, THE VAIL, MATURED MATRIAL PINK, CONDITION FOR ORDINARY\_COLONIZATION, THE ONE, THE WING*, Untitled object by Choi Xooang; Chukchi seal gut parka in Anadyr City Museum; DIY Electrical bike, image retrieved online, source not identified; Rain parka of bear intestines made by Helen Dick, Alaska (2008).

33 Figure 11 Dyeing workshop documentation. Colourant: spirulina and chlorella. Silk fabric, acrylic medium, reindeer hair.

34 Figure 12 Samples in rehearsals. A selection of colour samples and material explorations. Colourants: acai berries, chlorella, spirulina. The acai samples have been immersed in the dye bath for up to 14 days,

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56 Figure 28 Rehearsal documentation photo. Sequence with semi-dry microbial cellulose interactions during first rehearsal. The microbial cellulose was brought to rehearsals as costume material, and from early on it was clear that it needed to be present onstage first and foremost as itself, as material with specific qualities, provocations, agencies

57 Figure 29 Rehearsal documentation photo. Sequence with interactions between two performers, wet and semi-dry microbial cellulose, attachments, movements of bodies, and movements of cellulose material. The microbial cellulose needed to endure the dynamic energies and movements frequently present in the rehearsals.

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60 Figure 32 Performance costume documentation photo. On these images, darker coloured dots can be seen on the microbial cellulose. These dots are probably pigments produced by other microbes. The photos also show the patent we arrived at for securing the microbial cellulose to the performer's body: elastic bands with plastic buckles. The moisture of the cellulose provided a certain stickiness which helped "glueing" the material to the skin/body.

61 Figure 33 Microbial cellulose in the onstage container. These cellulose bits are a combination of cellulose used for two months in rehearsals, cellulose used for a few days, cellulose that has been kept moist throughout, and cellulose that has been dried and re-wetted.

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## APPENDICES

### Appendix 1: Performance details and programme facsimile *Posthuman*

#### **Posthuman**

Choreographer: Jenni-Elina von Bagh

Costumes: Ingvill Fossheim

Scenography: Fabian Nyberg

Lights: Luca Sirviö

Composer, musician: Ilkka Tolonen

Collaborator: Kalle Pulkkinen

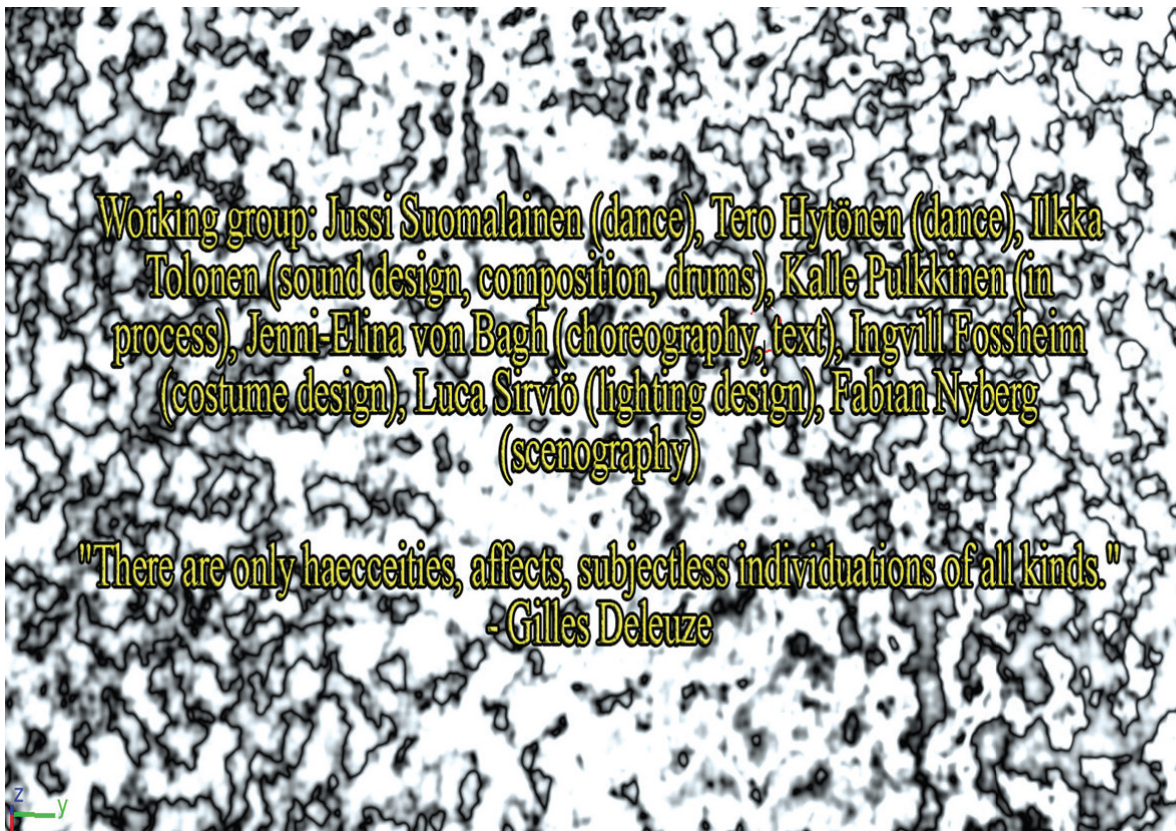
Onstage: Tero Hytönen, Jussi Suomalainen, Ilkka Tolonen

Premiere in December 2016.

Performed at the Theatre Academy's Teatterisali, Helsinki 1.12 - 8.12.2016. These performances were part of the course: 'Dance as a Total Form of Art', co-organised and produced by the Theatre Academy, UniARTS Helsinki and the Department of Film, TV and Scenography, Aalto University.

The production was included in NEUNEW digital festival 2017.

Full length video documentation: <https://vimeo.com/196635925/51a5bb1849>



**Appendix 2: Performance details and programme facsimile *a life - nomadic melodrama***

**a life - nomadic melodrama**

Choreography: Jenni-Elina von Bagh

Costumes: Ingvill Fossheim

Lights: Luca Sirviö

Sound design: Ville Kabrell

Set: Virpi Nieminen

Dramaturges: Elli Salo, Otto Sandqvist

Collaborator: Outi Markkula

Onstage: Johannes Purovaara, Hanna Raiskinmäki, Jussi Suomalainen

Premiere in November 2017.

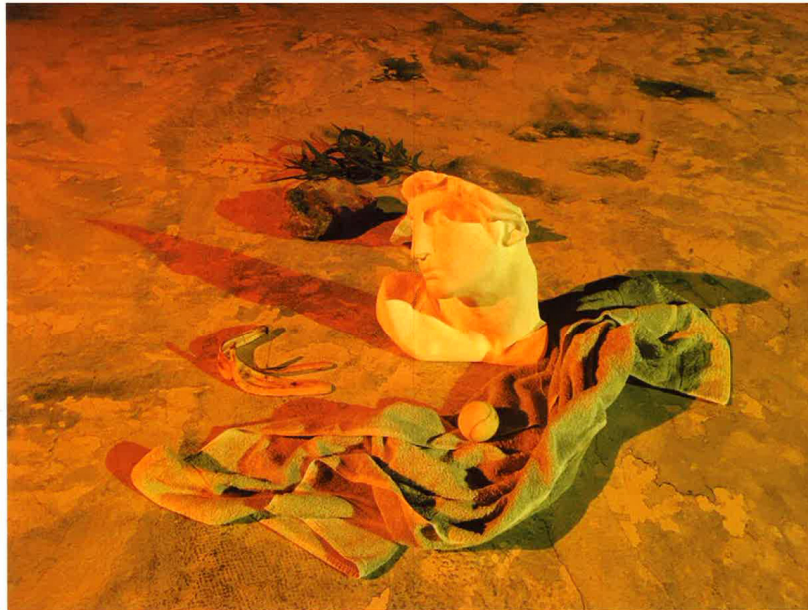
Performed at Aalto Studios` Kallio Stage, Helsinki 16.11 - 25.11.2017.

Produced by the Theatre Academy, UniARTS Helsinki and the Department of Film, TV and Scenography, Aalto University.

Full length video documentation: <https://vimeo.com/244800787>

Password: ALife17

**a life**  
nomadic melodrama



**TENTTELÄ-KORKEIKKO**  
X TAMMELIIPPISTO

**A!**  
Aalto-yliopisto

**Työryhmä:**

Jenni-Eliina von Bagh (TK, MA tait. opinnäyte), Ingvill Fossheim (Aalto ARTS, MA tait. opinnäyte), Ville Kabrell (ÄMa), Outi Markkula (TT), Virpi Nieminen (Aalto ARTS), Johannes Purovaara (RT), Henna Rajskinmäki (vier.), Elli Salo (DMA), Otto Sandqvist (DMA), Luca Sirviö (VMa), Jussi Suomalainen (TT)

ohjastaja: Marja Zia

luovutus: Johanna Almarinen, Sirpa Luoma

muusikot: Anja Behem (Aalto)

laulajat: Taina Hägg

AV-tuot: Jyrki Oksanen

valokuva: Anniina Veijalainen

kirjuri: Heikki Laakso

suunnittelija: Nina Numminen

lipunmyyjät: Aapo Juusti

Aalto Studios

Kallio Stagen tekniikka: Marko Kettunen ja Ville Manninen

Ohjaavat opettajat: Liisa Risa (koreografia), Camilla Nenonen (lavastus), Taina Relander (pukusuunnittelu)

17.10. klo 19  
 18.10. klo 19  
 19.10. klo 19  
 20.10. klo 19  
 21.10. klo 19  
 22.10. klo 19

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### **Appendix 3: Performance details and programme facsimile *Posthuman Days***

#### **Posthuman days**

Choreography and directing: Jenni-Elina von Bagh

Costume design and microbial cellulose: Ingvill Fossheim

Light design: Ina Niemelä

Set and video design: Fabian Nyberg

Sound design and composing: Tom Lönnqvist

Dramaturgy: Otto Sandqvist

Texts: Jenni-Elina von Bagh, Otto Sandqvist and workgroup

Performers: Jenna Broas, Karoliina Kauhanen, Anni Koskinen, Outi Markkula, Pinja Poropudas

Premiere in October 2018.

Performed at Zodiak Stage, Helsinki 18.10 - 28.10 2018.

Produced by Zodiak - Centre for New Dance and Jenni-Elina von Bagh.

With the support of the Finnish Cultural Foundation, Alfred Kordelin Foundation, Norsk-Finsk Kulturfond, RadArt Marked, ChemArts/Aalto ARTS, Aalto Studios.

Performance webpage: [www.posthumandays.info](http://www.posthumandays.info)

Full length video documentation: <https://vimeo.com/312564000>

Password: post2018human



**Ensi-ilta | Premiere:**  
ke 18.10.2018 klo 19.00  
Zodiak Stage, Kaapelitehdas, Helsinki

**Muut esitykset | Performances:**

La 20.10. klo 19.00\*  
Su 21.10. klo 15.00  
Ti 23.10. klo 19.00\*\*  
Ke 24.10. klo 14.00  
Pe 26.10. klo 19.00  
Su 28.10. klo 15.00

\*Teosalustus | Pre-talk

\*\*Taiteilijataapaaminen | Post-performance discussion

**Esityksen kesto | Duration:**  
60 min



**ZODIAK**



Yhteistyössä



KANTAESITYS | PREMIERE



## Posthuman days

Koreografia ja ohjaus | Choreography and directing:

**Jenni-Elina von Bagh & työryhmä | working group**

Esitys | Performance:

**Jenna Broas, Karoliina Kauhanen, Anni Koskinen, Outi Markkula ja Pinja Poropudas**

Äänisuunnittelu ja sävellys | Sound design and composing:

**Tom Lönnqvist**

Lukuunottamatta kappaleita: Tubeway Army "I nearly married a human" (courtesy of Gary Numan), Bob Dylan "Mama you've been on my mind"

Pukusuunnittelu ja bakteeriseluloosa |

Costume design and bacterial cellulose:

**Ingvil Fossheim**

Lavastus- ja videosuunnittelu | Set and video design:

**Fabian Nyberg**

Valosuunnittelu | Lighting design:

**Ina Niemelä**

Dramaturgi | Dramaturge:

**Otto Sandqvist**

Tekstit | Texts:

**Jenni-Elina von Bagh, Otto Sandqvist ja työryhmä | working group**

Valokuvaus | Photos:

**Katri Naukkarinen**

Tuotanto | Production:

**Zodiak – Uuden tanssin keskus, Jenni-Elina von Bagh**

Mitä on ihmisen jälkeinen subjekti? Mitä on ihmiskeskeisyydestä luopuminen? Posthuman days on näyttämöllinen käännösmomentti filosofisesta käsitteestä 'posthuman'. Teos käsittelee tätä filosofista käsitettä näyttämön kontekstissa ja kompositiossa.

Käsitteenä 'posthuman' on laaja ja rikas. Se laajenee verkostomaisesti eri nykyfilosofian diskursseihin, kuten nomadinen subjekti, dynamiikka, intensiteetti, vire, tuleminen, suhde muutokseen, orgaaninen ja ei-orgaaninen elämä. Käsite on juuriltaan vahvasti feministinen. Ajankohtaisuudessaan 'posthuman'-käsite asettuu kyseenalaistamaan ihmistä keskiössä. Mikä on tämä murren aika maailmassa, ihmisen tietoisuudessa suhteessa maailmankaikeuteen? Taiteellisenä haasteena on amentaa tästä tematiikasta niin, että teoria ohjaisi taiteellista ajattelua, mutta näyttämö myös irtaantuisi ja itsenäistyisi resonoimaan omassa praktikassaan, ja siten myös vapautuisi luomaan uudenlaista ajattelua. Teoreettisina viitteinä teos käyttää muun muassa Rosi Braidotin teosta Posthuman 2013 ja Donna Harawayn teosta Cyborg manifesto 1984.

Koreografina olen kiinnostunut filosofian ja näyttämön välisestä yhteisresonanssista. Miten avautuu posthumanismin paradokseille? Miten esiintyjän ruumis antautuu kohtaamaan itselleen vierasta ja tuntematonta, suhteisuudessaan ja kytkeytyneisyydessään? Kompositionaalisisessa tapahtumassa minua kiinnostaa törmäyttää puheen ja ilmaisullisten rekistereiden, materian, objektien, ja erilaisten näyttämötekniikoiden tasoja keskenään; pinnallisen ja syällisen yhteiselo ja riskinotto suhteessa esityksen kokonaisuuden hallittavuuteen. Postantroposenttrinen ajattelu on tietyllä tavalla mahdotonta ja kuitenkin kiihottava haaste juuri näyttämöllisenä, kehollisena ja performatiivisena kysymyksenä.

- Jenni-Elina von Bagh

How to translate the core questions of this production into costumes and costume material? One response is bacterial cellulose. Studying the qualities of cellulose grown from microbes, the process of making Posthuman days includes research on how this alternative material may serve as a collaborator in the context of costume design for contemporary dance

-Ingvil Fossheim

### Kiitokset:

Maija Hirvanen, Harri Kuorelahti, Heikki Paasonen, Hanna Raiskinmäki, Timo Wright, Johanna Ilmarinen at Aalto Studios, the CHEMARTS team, Juhana von Bagh, Astrid, Olavi, Alvar ja Jussi Salminen, Henri, lapset ja äiti

Teksteissä referenssejä Rosi Braidotin teoksesta The Posthuman, Samuel Beckettin näytelmästä Happy Days sekä elokuvista: Blade Runner (1982), 2001: Space Odyssey (1968), Lost in Translation (2003), The Hours (2002), Mulholland Drive (2001), Annihilation (2018), Transformers (2007)