UNCONTAINABLE LIFE

A BIOPHILOSOPHY OF BIOART

Marietta Radomska

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Introduction

Art is where the becomings of the earth couple with the becomings of life to produce intensities and sensations that in themselves summon up a new kind of life.

(Grosz 2008, 79)

Sculptures made of living tissue, a bunny whose fur glows in the dark, butterflies whose wing patterns are genetically modified, tattooed skin cultures, and, finally, an artist who injects herself with horse blood plasma; all of these artistic projects have drawn the attention of art critics and popular media alike over the past two decades. They are just a few examples of bioart, a current in contemporary art that involves the use of biological materials (living elements: cells, tissues, organisms) along with scientific procedures, protocols, and tools. In this way, bioart may also be defined as a form of hybrid artistico-scientific practice. Its emergence can be seen as a playful, critical, and creative artistic response to the development and presence of biotechnologies¹ and related techniques and procedures in contemporary scientific and popular-scientific discourses, as well as in cultural imaginaries.² Bioartworks explore the issues of the boundaries between the living and non-living,

¹ In common terms, biotechnologies may be defined as contemporary practices of applied biology that involve the use of living materials/biomaterials and bioprocesses in fields like engineering and technology.

² In *Dangerous Discourses* (2009), Margrit Shildrick connects her use of the concept “cultural imaginary” to the definition provided by Rosi Braidotti, who sees it as “a system of representation by which a subject gets captured or captivated by a ruling social and cultural formation: legal addictions to certain identities, images and terminologies” (Braidotti 2006, 85–86 cited in Shildrick 2009, 62). More specifically, this means that the cultural imaginary can be understood as a cultural fantasy landscape comprising a collection of images and ideas of the body and the subject as autonomous, contained, and unified. While both Braidotti and Shildrick use the singular form of “cultural imaginary,” I prefer the form: “cultural imaginaries,” which emphasises the plurality of cultures in which such fantasy landscapes are grounded. This aspect of plurality has been particularly highlighted by scholars in the field of cultural studies (see e.g.: Dawson 1994).

organic and inorganic; the relation between the human and nonhuman; as well as various thresholds of the living.

This thesis argues that thinking through bioart is a biophilosophical practice that contributes to a more nuanced understanding of life than we encounter in mainstream academic discourse. When examined from a Deleuzian feminist perspective, bioartistic projects underscore the inadequacy of asking about life's essence. Instead of examining the defining criteria of life, bioartistic practices explore and enact life as processual and *uncontainable*, thus surpassing preconceived material and conceptual boundaries. This means that the present project concentrates on the ontology of life as it emerges through selected bioartworks.

By engaging with the Tissue Culture and Art Project (TC&A)³ and its sculptures made of bioengineered animal tissue cultures (Chapters Two and Four) as well as L'Art Orienté Objet (AOO), whose project *May the Horse Live in Me* involved the artist being injected with horse immunoglobulins (Chapter Three), I examine the enmeshment of the living and the non-living, the multiplicity of transspecies embodiment, and, finally, life's uncontainable, uncontrollable, and indeterminate character.

As a philosophical project with an ontological focus, written from within the transdisciplinary field of gender studies, this thesis takes Deleuzian feminisms and biophilosophy as its theoretical ground. The contemporary landscape of natural sciences and advanced bio- and information technologies not only impacts the lives of humans and nonhumans alike, but also interferes with life at the molecular level of tissues, cells, and the genetic code itself.⁴ In this way, the meanings of biopower and biopolitics,⁵ as they have been defined by Michel Foucault,

³ See: TC&A 2000; TC&A, The Tissue Culture and Art Project n.d.

⁴ See: Lykke and Smelik, 2008.

⁵ The issue of biopolitics and neovitalism as frameworks for thinking life in contemporary theory, which I discuss in detail in Chapter One of this dissertation, formed part of my reflection in the RMA thesis, *The Concept of Life in Feminist Posthumanist Theories: From Philosophy to Bioart*, which I completed in 2011 at Utrecht University (Radomska 2011). This initial study, primarily focused on the spatial, temporal, and material premises of the concept of life in feminist posthumanist theories

have also shifted. Biopolitics is no longer exclusively concerned with the human population. Rather, through technoscientific means, it operates at the level of the materiality of life processes. Furthermore, contemporary forms of biopower and biopolitics, and their close connection with technoscience, have a major impact on our understanding of the subject. Theorists whose work is rooted in such areas as science and technology studies, continental philosophy, and feminist theory have, in recent years, shifted their attention to the question of posthumanism, understood broadly as a cultural and philosophical field that critically revises the conventional concept of the Enlightenment human subject and investigates its relations to nonhuman others (both organic and inorganic). It should be noted that there are multiple understandings of posthuman(ist) theory. As Manuela Rossini (2006, n.p.) explains, posthumanist ideas may be traced back to Friedrich Nietzsche's announcement of the death of God and Martin Heidegger's *Letter on Humanism* ([1949] 1998) and form part of the poststructuralist and postmodernist trajectory. At the same time, Norbert Wiener's theory of cybernetics (Wiener 1948) inspired developments focused on the enhancement of the human body through technological, prosthetic and neuropharmacological means, which N. Kathrine Hayles (1999) calls "cybernetic posthumanism" and which contributed to the emergence of the transhumanist movement.⁶ The ideas of perfecting human (mental and physical) capacities through biotechnological, technological, and neuropharmacological means and the longing for bioinformatics-driven disembodiment constitute the core of transhumanism.⁷ Transhumanism is often misnamed as posthumanism, which creates confusion. It is important to emphasise that whereas posthumanism critiques Enlightenment Humanism, anthropocentrism, and speciesism,

(Karen Barad's agential realism in particular), served as an inspiration for the present argument and the broadened focus of this dissertation.

⁶ See: Rossini 2006.

⁷ The movement unites philosophers, artists, and scientists, for example: Swedish philosopher and director of the Future of Humanity Institute at Oxford University, Nick Bostrom (Bostrom 2000); media artist, Natasha Vita-More, (Vita-More 1999); and theorist, Ray Kurzweil (Kurzweil 1999).

transhumanism reinforces the central position of the human and Enlightenment Humanist hierarchies. Thus, these two strands of thought, posthumanism and transhumanism could not be more distant from each other.

Within the field of contemporary feminist theory, the themes that I call posthumanist are: a decentring of the human subject, a non-anthropocentric ontology and ethics that consider the human as necessarily enmeshed in a multiplicity of relations with human and nonhuman others, a dynamic and agentic account of matter, and the refusal of human exceptionalism. These are also the problems that – to a different degree – occupy the writings of both Deleuzian feminist philosophers such as Rosi Braidotti, Claire Colebrook, and Elizabeth Grosz, and science studies scholars such as Karen Barad and Donna Haraway.⁸ It is their conceptual apparatuses and philosophical frameworks, along with the tradition of continental philosophy in which they are rooted, that have inspired this project. In particular, Gilles Deleuze and Félix Guattari's conceptualisations and the body of work of feminist philosophers who engage with their writings allow me to think the question of life through bioartworks analysed in the following chapters.

1. On Biophilosophy and Posthumanist Feminisms

1.1. Biophilosophy: a Historical Background

Biophilosophy is often equated with the philosophy of biology, a study of the epistemological, metaphysical, conceptual, and methodological

⁸ It should be emphasised that not all of these thinkers would accept the “posthumanist” label. This is also why I use the term posthumanist feminism only in a provisional way. From the names I enlist here, it is perhaps only Braidotti (who discusses the posthuman modes of subjectivity and posthumanist ethics in a number of her texts, including her recent book, *The Posthuman*) and Barad (who also argues for posthumanist performativity and ethics in several of her works) who would embrace the category of “posthumanist feminist theorist.”

foundations of the biological sciences.⁹ Although the history of the philosophy of biology may be traced back to the 1950s and the works of philosopher Morton Beckner (1959) and biologist J.H. Woodger (1952), it is only during the 1970s and '80s that the philosophy of biology becomes a vibrant discipline. Its enquiry can be divided into three interrelated components: a consideration of the general theses of the philosophy of science in the context of biology, an examination of bioscientific concepts, and the employment of biological concepts or problems in the investigation of traditional philosophical issues.¹⁰ Philosopher Colin Allen and cognitive ethologist Marc Bekoff (1995) argue that using the notion of biophilosophy in place of philosophy of biology allows one to keep in mind that the enquiry concerning the philosophical principles, methodology, fundamental concepts, and logic of the biosciences occupies the attention of researchers representing various fields and not only philosophers interested in biology.

In this project, which is primarily concerned with the understanding of life, I adopt Eugene Thacker's (2008) distinction between philosophy of biology and biophilosophy, drawn in connection with the problem of life.¹¹ As Thacker points out, traditionally, the philosophy of biology has

⁹ See e.g.: Sattler 1986; Mahner and Bunge 1997.

¹⁰ See: P. Griffiths 2008. In order to make this division clear, it is worth invoking several examples mentioned by Griffiths. The consideration of general themes in the philosophy of science in the context of biology may be illustrated by the application of the logical model of theory reduction to the relation between Mendelian genetics and contemporary molecular genetics. An example of the concern with bioscientific concepts could be the discussion of the role that the reproductive fitness of organisms plays in evolution. Other instances of this type of enquiry are the debates on the definition of life or the understanding of the concept of species. The third type of enquiry within the philosophy of biology may be exemplified by the discussions on the issues of teleology, determinism, or mechanism in the context of biology.

¹¹ Spyridon A. Koutroufinis (2014) also holds that the distinction between the philosophy of biology and biophilosophy is an important one, while pointing out that the former could be understood as a sub-discipline of the latter. He suggests that the notion of biophilosophy refers to all philosophical enquiry concerned with the problem of life and the living, from the Ancient Greeks (most notably, Aristotle), through Descartes and Immanuel Kant, to postmodernism and other strands of contemporary philosophy. The philosophy of biology, on the other hand, shares major concerns with the philosophy of science.

been predominantly concerned with thinking about life in a dual way: asking about life's basic principles on the one hand, and about its boundaries of articulation on the other. Concern with the basic principles of life may be translated into the question of what is the basic unit and "essence" of life (for instance, DNA in the case of genetic reductionism). The issue of boundaries of articulation is mainly linked to the problem of differences between the living and non-living, organic and inorganic, human and nonhuman, as well as the boundaries delineating the species and the organism. Biophilosophy, Thacker argues, is not necessarily the opposite of the philosophy of biology. However, it does critique the double focus of the philosophy of biology on the essence of life on the one hand, and its universal characteristics and classification on the other.¹² Instead, biophilosophy focuses on that which transforms life; it approaches life as a "multiplicity ... the network of relations that always take the living outside itself, an extrinsic diagram as opposed to intrinsic characteristics" (Thacker 2008, 135). Multiplicity does not equate to "many" (as in the traditional juxtaposition of "one-many"), but instead can be understood in terms of a combinatorial, proliferating number (ibid., 135) or difference "shown differing" (Deleuze 2004, 68). Whereas the search for the essence of "life itself," both in traditional Western philosophy (e.g. seen as *psychē*) and the philosophy of biology (e.g. in the form of the genetic code), has always been trapped within the binaries of nature-culture and human-nonhuman, Thacker continues, biophilosophy traverses these planes, opening up a space for conceptual creativity and evading the anthropomorphisation of the concept of life. He enlists a number of examples that challenge the traditional

¹² Thacker also draws attention to a certain "plasticity" in the concept of life, its "shape-shifting quality exhibited in all the different ways in which life is thought and shaped" (2010, 4). He further discusses four problems directly linked to this abundance of meanings ascribed to the notion of life: 1) the vast range of meanings ascribed to the term "life" results in the notion losing any stable meaning; 2) the hegemony of the scientific understanding of life that has to fulfil a list of criteria (and often results in reductionism); 3) the banalisation of the term "life" as meaning living in the world through time or the "experience of being alive"; and 4) anthropocentrism and anthropomorphism related to the concept of life and its usage (ibid., 4–5).

understanding according to which life, death, the organism, and the biologic of genes are contained within set frames (e.g. the intelligence of swarms, communication and dynamic relations between molecules, and so-called “lifelike death” that on the one hand refers to the in-between creatures inhabiting cultural imaginaries, and on the other relates to phenomena in which the organic and inorganic, material and immaterial merge with one another). In this context, Thacker reminds us that it is important to keep in mind that biophilosophy should not serve as a replacement or a new version of the theories of complexity or emergence. Instead, it should be understood as a critical, creative, and rigorous practice of “questioning of the twofold method of the philosophy of biology (principle of life, boundaries of articulation), and the divisions that are produced from this. Biophilosophy always asks, ‘What relations are precluded in such-and-such a division, in such-and-such a classification?’” (Thacker 2008, 141). In this way, biophilosophy is concerned with the ontological aspects of the problem of life, while simultaneously paying attention to the issues of relations, their dynamics and mechanisms of exclusion, which form the ethical side of this primarily ontological enquiry. Understood in this way, biophilosophy forms an important part of the philosophical project of Gilles Deleuze as well as the work of feminist philosophers Elizabeth Grosz, Claire Colebrook, and Rosi Braidotti, who, in a variety of ways, explore the conceptualisation of life as a material force, an intensity, a form of dynamism, transformation, inventiveness, and creativity that extends beyond the organic.¹³

The biophilosophical consideration of ethical and political matters also makes this field appear close in its investigation to another area of contemporary theory, the above-mentioned biopolitics. Before I contextualise biophilosophical thinking in Western philosophy, and especially in the feminist tradition, I will briefly look at the concept of biopolitics in order to show both its divergences from and similarities to

¹³ The link between ontology and ethics also constitutes one of the main enquiries explored by feminist theorists Karen Barad and Donna Haraway. I return to their understanding of matter and human–nonhuman enmeshment later.

biophilosophical modes of theorising. The genealogy of biopolitics, understood as the study of the relations between power, politics, ethics, and life (most often figured as human life), can be traced back to the beginning of the twentieth century and the work of Swedish political theorist and politician Rudolf Kjellén. In his writings, Kjellén introduced two concepts: biopolitics and geopolitics, which also served as an inspiration for the German *geopolitik* of the late 1920s and '30s.¹⁴ Yet, in the Western tradition, the notion of biopolitics is primarily associated with the name of Michel Foucault, who developed, systematised, and popularised it as both a concept and an analytical framework. The questions of biopower and biopolitics are present throughout Foucault's oeuvre from the first volume of *The History of Sexuality (The Will to Knowledge)*, originally published in 1976. Here, Foucault talks for the first time about biopower as a mode of power that emerges in the eighteenth century and operates in a double way: on individual bodies (by disciplining them) and on the "species body," that is, the body of the human population (through the control and regulation of such factors as natality, mortality, lifespan, and the general health of the population). This theme continues in the series of lectures at the Collège de France: *Society Must Be Defended*, given in the years 1975–76; *Security, Territory, Population* in 1977–78; and *The Birth of Biopolitics* in 1978–79. In these lectures, Foucault traces the genealogy of the modern state in its connection with capitalism and the development of biopolitics, defined as a technology of power exercised over both the political and physical/biological body of the population, and concerned with such issues as the "ratio of births to deaths, the rate of reproduction, the fertility of a population" (Foucault 2003, 243). Described in this way, biopolitics

¹⁴ In *Outline for a Political System* (1920, 3–4) Kjellén describes the idea of biopolitics in the following way: "This tension that is characteristic of life itself...pushed me to denominate such a discipline *biopolitics*, which is analogous with the science of life, namely, biology. In so doing we gain much, considering that the Greek word *bíos* designates not only natural and physical life, but perhaps just as significantly cultural life. Naming it in this way also expresses that dependence on the laws of life that society manifests and that promote, more than anything else, the state itself to that role of arbiter or at a minimum of mediator." (cited in: Esposito 2008, 17)

comprises both knowledge production and actual intervention in “the birth rate, the mortality rate, various biological disabilities, and the effects of the environment” (ibid., 245), all closely linked to the economy and politics in the context of the Industrial Revolution. In short, it has been recognised that the occurrence of illnesses or accidents not only affects the health of the population as such, but also (and most importantly) causes financial loss for industrialists. Biopolitical mechanisms include a variety of forms, for instance, the improvement of public hygiene, safety measures, insurance programmes, and other factors.

The idea of politics and power that have the life of the species as their object has been revisited more recently in the context of present-day science, as well as bio- and information technologies, which affect, interfere in, and manipulate not only the life of an organism or a population, but the living matter itself (or, as some put it, “life itself”).¹⁵ This has also contributed to a certain proliferation of discussions on biopolitics within contemporary critical and social theory. Although theorists concerned with the problem of biopower rely on different understandings of life (from the life of the human in the case of Foucault and Giorgio Agamben, through life as a generative force in Braidotti, to the life of nonhuman animals in Cary Wolfe, all of which I address in the following chapters), it is the *relation* between life and politics, and, in particular, various modes of the latter that take centre stage in their biopolitical investigations. In other words, once a certain idea of life has been accepted, biopolitical enquiry focuses on the political processes and mechanisms that operate on and mould the life thus understood. While biophilosophy pays attention to life’s ethical, political, and epistemological entwinements, it takes ontology as its primary field of scrutiny and renders the question of life its focal point. The difference between biophilosophy and biopolitics lies in how each distributes its enquiry: biophilosophy prioritises the issue of the ontology of life, whereas biopolitics investigates the political enmeshment of organic (usually human) life. In this way, I consider biopolitics to be an adjacent

¹⁵ See e.g. Rose 2007.

field of study that may draw on biophilosophical understandings and unfold them in specific, political directions. This is also why this project investigates bioart as a biophilosophical practice and takes biopolitics into account only as an aspect or a part of the background that is characteristic of most contemporary philosophical discussions of life. Before I engage in detail with the conceptualisation of life that emerges through this dissertation, I will make a brief note about the context of the biophilosophical enquiry.

The question of life has occupied the attention of philosophers since the Presocratics who speak about *psukhē* – the basic principle that gives rise to everything (that is, every phenomenon, every element of the cosmos) and sustains it (e.g. for Thales the fundamental principle is water; for Anaximander it is the indefinite (*apeiron*); for Pythagoreans it is the abstract unity of number; for Anaximenes it is air, etc.).¹⁶ In *De Anima*, Aristotle comments on the presence of *psukhē* (translated as “soul”) in Presocratic thought, while focusing on its characteristic as a factor of motion in nature.¹⁷ Also, it is Aristotle who is seen as the first key thinker not only to take up the question of life as an ontological question, but also to establish the frame of this enquiry that, in one way or another, will remain present in Western philosophy even after Kant (Thacker 2010). To evoke Thacker again, one may paraphrase questions posed by Aristotle in *De Anima* in the following way: “To what extent is it possible to formulate an ontology of life that is not reducible to biology or sublimated within theology?” (Thacker 2010, 10). As he points out, Aristotle comes up with a set of characteristics specific and unique to life: it is defined through form (life is generative and creative in its different

¹⁶ See: Kirk, et al. 1983.

¹⁷ Motion is defined by Aristotle in a broad sense: it encompasses growth and development, alteration, and locomotion (Aristotle, *De Anima* 1.3.406a13–15). Furthermore, Aristotle points out that “soul” was characterised by his predecessors as a capacity not only for motion, but also for perception. He disagrees with the latter by arguing that perception is not common to all living organisms (plants do not perceive). This is also why, he suggests, the capacity for self-preservation, which he calls “the nutritive,” should be seen as a basic characteristic of life, instead of perception and along with motion (Aristotle, *De Anima* 2.2.413a21–35; 413b8–9).

forms); through time (referring to movement and change); and through spirit (that is, an immaterial essence or principle common to all forms of life). Yet, there is a problem with Aristotle's search for an adequate concept of life. On the one hand, the concept of life should transcend life in its different forms (so that it can account for these forms' dynamic character and change). On the other, it should be immanent to life so that it may manifest the inseparability between principle and manifestation (ibid., 11). The problem then is of the separation between the concept of life and the living. Aristotle deals with this by introducing a reworked concept of *psukhē* that equates with the principle of life, giving it the capacity for "self-nourishment, growth and decay" (Aristotle, *De Anima* 2.1.412a15). Along with the notion of the universal principle of life, he also introduces *zoē* (biological, vegetative life common to all organisms and gods) and *bíos* (the "good" life of citizens). These concepts play an important role in both Agamben's (1998) account of biopolitics and Braidotti's (2006) politics of life itself, which I address in Chapter One.¹⁸ What matters in the context of the historical background of the concept of life is that Aristotle's theorisation of *psukhē* allows him to formulate issues that will be important in any subsequent philosophies concerned with the question of life. As Thacker (2010, 13) emphasises, any ontology of life that follows Aristotle's path has to articulate what is the essence of life (basic principle); it also needs to set "boundaries of articulation" (e.g. categories through which the living may be distinguished from the non-living) as well as "governing motifs" (that is, the logical terms that order the analysis of life). As mentioned above, the principle of life and the boundaries of articulation are the two features of the philosophy of biology discussed by Thacker (2008). The elaboration of the concept of *psukhē* does not, however, allow Aristotle to evade the problem of the paradoxical relation between Life and its manifestations: "One cannot think Life without thinking the living; one cannot think Life while at the same time thinking the living" (Thacker 2010, 21).

¹⁸ For an insightful elaboration of the Aristotelean understanding of both terms see also: Arendt 1998.

Although I do not intend to provide an historical overview of philosophical perspectives on the concept of life here (which would be simply impossible), I do briefly mention those approaches to the problematic of life that have contributed to the current positioning of the idea of life in the context of Western philosophy and theory. Not all of these have had a direct influence on the biophilosophical strategy employed here. Some are mentioned in order to underline the contrast and the importance of rewriting the way in which Western tradition has thought life. Aristotle's problematic (including the issue of life thinking itself) reappears in a certain way in Immanuel Kant's interpretation of the question of life, which for him forms part of the issue of the self-world relation (see: Thacker 2010, 242–249); that is, it draws attention to the problem of the human as the living subject that engages with life as an object of thought. As Thacker notes in his commentary on Kant's *Critique of the Power of Judgement*, for Kant “any assertion of a concept of life is inseparable from its relative value as a life-for-us as human beings” (Thacker 2014, n.p.).¹⁹ This appears to be another way of reaffirming human exceptionalism and reinforcing the boundary between the human and the nonhuman (thus, greatly contributing to the anthropocentric character of Western thought). What is also worth mentioning is Kant's assertion that the necessary condition for life to be thought is its finality. This emphasis on the “internal purposiveness” of life (a purposiveness that is not imposed on the organism from without, but rather overlaps with this organism's functions and processes) serves for Kant as a way to navigate between traditional vitalism (with an external life force animating inert matter) and mechanism (reducing living organisms to mechanistic automata, as in the case of René Descartes).

A remedy for the split between Life (or “life-in-itself,” governed by the principle of life) and the living (framed through the boundaries of articulation), introduced by Aristotle and reaffirmed by Kant, appears in

¹⁹ This split between life as it is for us (the living) and life-in-itself (or the principle of life) is directly linked to Kant's distinction between *phenomena* (things as they appear to us) and *noumena* (inaccessible to us things-in-themselves).

the post-Kantian tradition. To put it simply, it is precisely because humans are living beings (the subjects of life) that they are able to think about the life of other beings and their own (life as an object). In other words, there is no division between (unreachable by human thought) life-in-itself and the living; instead, there is “an immanent life, omnipresent and universally affirmative” (ibid.). Thacker discusses the characteristic tendency in German Idealism of depicting life as such an immanent “flux and flow that runs through the world cutting across different material orders from the microcosm to the macrocosm” (ibid.). Thus painted, the ontology of life is what Thacker (2015) calls an “ontology of generosity”, in which life continuously manifests and affirms itself in the living, in the sense of both its development and decay. There are two variations of the ontology of generosity: according to the first, life appears as genesis, generation, production, processes of becoming while, following the second, it is portrayed as givenness, gift and donation, as that which is defined by “its being given, its giving forth, its being already-there, its affirmation prior to all being” (Thacker 2015, 111). As he emphasises, certain elements of these two tendencies in approaching life as an ontological issue may be independently observed in different strands of Western philosophy. For instance, life-as-givenness forms part of the ontological frameworks of phenomenologists (Jean-Luc Marion and Edmund Husserl). Life-as-genesis can be found in the process ontologies of Alfred North Whitehead, Henri Bergson, and Deleuze. It is exactly this path of thinking of life in the context of the concept of processuality that plays the major role in the present enquiry.

The problem of the split between life and the thought of life as a question of the relation between life and knowledge (as well as science) appears as one of the major themes in the work of Georges Canguilhem, a French philosopher and physician, whose theorisations of epistemology and life had a major impact on both Foucault and Deleuze. According to Canguilhem, there is no discrepancy, gap, or hierarchy between knowledge and life. The former is the product of the latter; it is a form of life and “a general method for the direct or indirect resolution of tensions between man and milieu” (Canguilhem 2008, xviii), or, in other words, a

“capacity to solve problems in new and creative ways” (Marrati and Meyers 2008, xi).²⁰ Life (both human and nonhuman) is not an irrational or “blind and stupid mechanical force” (Canguilhem 2008, xviii). Nonhuman life is not inferior to the human variety. They are different and they generate different kinds of knowledge. Canguilhem emphasises the importance of both the internal and external milieus of the organism: “the organism’s adaptation to its milieu is attributed to the initiative of the organism’s needs, efforts, and continual reactions. The milieu provokes the organism to orient its becoming by itself” (ibid., 115). Canguilhem conducts a thorough analysis and critique of the concept of the normal as it relates to biology and medicine, ultimately concluding that it does not have any inherent meaning: “neither the living being nor the milieu can be called ‘normal’ if we consider them separately” (ibid., 127). Further, he argues that life has its vital norms, which manifest themselves in the ways that the organism affects its milieu and accommodates to it (ibid., 113). As he underlines, it is this relativity of the normal that can be seen as the rule (ibid., 130). Thus, life in in “the pathological state is not the absence of norms, but the presence of other norms” (ibid., 131). Illness is a vital norm just as much as health: they are merely two different ways in which the organism adapts to the changing aspects of its external and internal milieus. Furthermore, Canguilhem critically considers vitalism, demonstrating that it should not be thought in terms of an appeal to any specific set of characteristics that would describe the essence or source of life. Instead, vitalism’s relevance lies in its focus on the openness of the meaning of the relation between science and life.

These approaches to the question of life, from Aristotle to the German Idealists, form part of what from a Deleuzian perspective could be seen as a mainstream (and mostly static) history of philosophy. In his work, Deleuze posited a sort of counter-history of philosophical thought

²⁰ The term *milieu* (“surroundings,” from French *milieu*: “middle, medium, mean,” literally “middle place” (Harper 2004b)) describes the environment (both external and internal) of the organism. It is one of the central terms (in German: *Umwelt*) in German biologist Jakob von Uexküll’s theory concerning the ways in which living organisms perceive and communicate with their environment. See: Uexküll 2010.

by reading and thinking with these philosophers who were usually located at the margins of history and who, according to Deleuze, formed a minor tradition in European thought (Bergson, Baruch Spinoza, and Friedrich Nietzsche, among others).²¹ It is these thinkers who contribute, along with nineteenth- and twentieth-century biologists and physicians, to a different approach to the problem of life.

Deleuze and Guattari's formulation of the concept of life is intrinsically linked to their reading of Bergson's ideas of duration and *élan vital* (vital impetus; vital force), Spinoza's ethics of affects, Nietzsche's eternal return, and Gilbert Simondon's individuation. According to Elizabeth Grosz (2010), Charles Darwin's understanding of the differences between various forms of life is a question of degree and not kind. As she indicates, this observation contributed directly to Bergson's conceptualisation of creative evolution and indirectly to Deleuze's own understanding of life as that which "runs between them [the organic and the inorganic], an impersonal force of contraction and dilation that characterizes events, even non-living events, as much as it does life" (Grosz 2011, 27). In this way, life is not a property that pertains to an individual; instead, it is an impetus, of which an entity might be an expression. Life is not opposed to matter, nor does it have a transcendent source. Rather, it is "the elaboration and expansion of matter, the force of concentration, winding or folding up that matter unwinds or unfolds" (Grosz 2011, 31).²²

According to Deleuze, Spinoza theorises ethics as different from morality: in Spinoza "Ethics, which is to say, a typology of immanent modes of existence, replaces Morality, which always refers existence to

²¹ More specifically, according to Deleuze, they are the "authors who challenged the rationalist tradition in this history [of philosophy] (and I see a secret link between Lucretius, Hume, Spinoza, and Nietzsche, constituted by their critique of negativity, their cultivation of joy, the hatred of interiority, the externality of forces and relations, the denunciation of power ... and so on)" (Deleuze 1995, 6).

²² Following Bergson and Deleuze, Grosz also emphasises the importance of indeterminacy in this take on matter and the concept of life: "It is the vital indeterminacy of the material world that enables life and that life exploits for its own self-elaboration" (2011, 34). This aspect of indeterminacy in the context of matter's dynamism is also raised by Barad in her theory of "agential realism", which I discuss in Chapter One.

transcendent values... Morality is the *system of Judgement*" (Deleuze 1988, 23; italics in the original). Thus, ethics is concerned with relationalities between different elements; it focuses on whether the encounters and relations into which the body enters are compatible with this body and increase its power (in which case they are considered good) or, conversely, whether they diminish and decompose this body's power (and, thus, are considered bad). Deleuze's Spinoza replaces the opposition of moral values (Good-Evil) with "the qualitative difference of modes of existence (good-bad)" (ibid., 23). Ethics does not rely on a comparison or reference to an independent and external principle or code; instead, its perspective is "relative and partial" (ibid., 22). It is this concern with relations and their specificity that I have in mind each time I refer to the question of ethics in the present project.

Bergson's *élan vital*, as Keith Ansell Pearson underlines, is read by Deleuze "as an internal explosive force that can account for the "time" of evolution as a virtual and self-differentiated movement of inventions" (Ansell Pearson 1999, 21). In Deleuze's work, this movement of inventions is in Deleuze's work linked to his interpretation of Nietzsche's eternal return as the return of difference:

It is not the same which returns, it is not the similar which returns; rather, the Same is the returning of that which returns, – in other words, of the Different; the similar is the returning of that which returns, – in other words, of the Dissimilar. The repetition in the eternal return is the same, but the same in so far as it is said uniquely of difference and the different. (Deleuze 2004, 374; italics in the original)

In other words, understood in this way, eternal return describes becoming: transformations with no starting point, initial cause, or final goal. Deleuzian difference is not a measure of comparison (it does not refer back to an identity or an original): instead, it should be understood as "difference in itself" or "pure difference": the processes of differing, in which every instance, moment, entity, event, and perception is singular and unique. This motif of singularity is also supported by Deleuze's reading of Simondon's concept of individuation, referring to an open-

ended process in which an individual emerges (“crystallises”) from a pre-individual field of potentials. The individuated entity, according to Simondon, is never a final, complete individual. Rather, it is always in a metastable relation with its milieu. As he states, the emergence of an individual is “matched by a perpetual individuation that is life itself following the fundamental mode of becoming: *the living being conserves in itself an activity of permanent individuation*. It is not only the result of individuation, like the crystal or the molecule, but is a veritable theater of individuation” (Simondon, 1992, 305).

Along with a non-dialectical understanding of difference (difference that is not based on identity, but is rather understood as a process), a dynamic idea of matter and duration (a non-quantified flow of time experienced in its immediacy),²³ and the concept of becoming (open-ended processuality, ongoing transformations),²⁴ Deleuze and Guattari underline the crucial character of connections. It is, broadly speaking, this interconnectivity that affects the ways in which organisms or entities materialise and transform.²⁵ Becoming precedes the subject as well as the

²³ Cliff Stagoll describes Deleuze’s use of the concept of duration in the following way: “As such, duration is the immediate awareness of the flow of changes that simultaneously constitute differences and relationships between particulars. ... duration is always present in the ‘givenness’ of one’s experience. It does not transcend experience ... Furthermore, duration, unlike matter, cannot be divided into elements which, when divided or reconstituted, remain the same in aggregate as their unified form. Duration, as lived experience, brings together both unity and difference in a flow of interconnections” (2010, 82-83).

²⁴ As Stagoll underlines, for Deleuze “becoming is neither merely an attribute of, nor an intermediary between events, but a characteristic of the very production of events. It is not that the time of change exists between one event and another, but that every event is but a unique instant of production in a continual flow of changes evident in the cosmos” (2010, 26).

²⁵ As Keith Ansell Pearson (1999) argues, one may notice the impact of the German biologist, August Weissman’s (1834–1914) germ plasm theory on Bergson’s and Deleuze’s thinking about the flow of intensities and becoming of durational forces. Weissman claimed that the organism contains two types of cells: somatic cells that take care of regular bodily functions, and gametes that carry hereditary material and are continuously transferred between generations without being modified along the way (i.e. in an identical state). While Bergson and Deleuze in no way follow the idea of unchangeability, the idea of ongoing flows of becoming is to some extent inspired by Weissman’s contribution.

organism: “Rather than a product, final or interim, becoming is the very dynamism of change, situated between heterogeneous terms and tending towards no particular goal or end-state” (Stagoll 2010, 26). Furthermore, following Jakob von Uexküll, Deleuze and Guattari also develop the issue of milieu as crucial for the (trans)formations and communication of organisms. As Ansell Pearson (1999) proposes, their conceptualisation of life can be read through the selection of contemporary biological theories that emphasise the crucial character of the relation between the environment and the organism on both the external and internal levels. Among other aspects, these theories draw attention to the fact that, in order to replicate, DNA requires certain cellular conditions and enzymes, and thus cannot be seen as a (self-sufficient) code of all life, as some reductionists suggest. Another example is American biologist Lynn Margulis’ theory of endosymbiosis, according to which genetic variation in eukaryotic cells to a large extent results from the exchange or transfer of nuclear information between viroids, viruses, or bacteria and eukaryotic cells.²⁶

Life as a material force, processuality enacted through connections and intra-actions,²⁷ and radically immanent²⁸ becoming all form part of the diverse field of contemporary continental feminist theory. On the one hand,²⁹ feminist philosophers who closely engage with Deleuze and Guattari’s writings critically and creatively draw on the ideas of becoming, difference, and duration: Braidotti offers the concept of *zoe*, a generative force or life itself, and discusses its enmeshment with politics

²⁶ Margulis’ work in general, and the theory of endosymbiosis in particular, has inspired many posthumanist feminist theorists (e.g. Rosi Braidotti, Donna Haraway, and Myra Hird).

²⁷ The concept of intra-action, introduced by Karen Barad (2003), refers to the fact that relations and phenomena (collectives of different components enmeshed in a multitude of relations) precede the constitution of boundaries between these components.

²⁸ I discuss Deleuze’s concept of radical immanence in Chapter Two.

²⁹ I do not intend to construct a classification of contemporary feminist theory, nor do I aim to reduce its philosophical diversity. The provisional distinction between philosophers and science studies scholars that I draw here serves as a way to underline different traditions and backgrounds among theorists whose work is crucial to the present dissertation.

and ethics;³⁰ Grosz reads Deleuze's work through Bergson and Darwin, while focusing on both opening towards the future and the relation between the living and non-living; and Colebrook argues for a passive vitalism, a philosophy that starts from "the event of imagining as such" (Colebrook 2010, 185) and is able to account for its own philosophical situatedness.³¹ On the other hand, feminist science studies scholars emphasise the dynamic, agential character of matter, its indeterminacy, and the primary character of relations and processes. Drawing on quantum physics, Barad focuses on the enmeshment of the material with the discursive as well as time, space, and matter, and demonstrates that it is not individuals but phenomena that are the primary ontological units. Donna Haraway emphasises the intertwining of the natural and cultural (thus, the concept of "naturecultures"), organic and inorganic, material and immaterial, as well as co-constitutive relations between humans and nonhumans. All these perspectives not only offer non-anthropocentric approaches to ontology, in which life is always already material and processual, indeterminate, and enacted through multiple connections and interactions, but also they engage with the questions of accountability and responsibility, of what gets excluded or never materialises, of affecting and being affected, and, finally, the question of "how one might live" (May 2005, 8) – in short, revisions of classical ethical perspectives. Posthumanist feminisms ask about ontology, yet this enquiry is also linked to the issue of ethics. I will return to this problem in Chapter One and the Conclusion.

³⁰ In several of her works, Braidotti critiques Agamben's conceptualisation of *zoe* as inscribed in the economy of finitude: "assimilated to death in the sense of the corpse, the liminal bodily existence of a life that does not qualify as human" (Braidotti 2006, 39). Instead, she offers a theorisation of *zoe* anchored in Spinozist ontology in which it is understood as a material force that pertains even after the life of an individual ends. Thus conceptualised, life does not require the idea of its own termination (death) as a condition, a delimiting factor, or a constitutive outside.

³¹ Colebrook puts it succinctly, "philosophy must be a vitalism, an awareness that its questions are always articulated from this life in which we find ourselves, and that all possible philosophical articulations – from idealism to linguisticism to spiritualism and nihilism – have to be accounted for as ways in which this life has expressed itself" (Colebrook 2010, 185).

1.2. Matter, the Non/living, and Uncontainable Life

In order to think about this problem of life by way of a biophilosophical analysis of bioart, I offer the concept of *uncontainable life*. This concept is intended to refer to an understanding of life as a material, dynamic, and excessive force of transformation that traverses the divide between the living and non-living, organic and inorganic, human and nonhuman, growth and decay, and, ultimately, life and death, as they are currently conceived. Bioartworks help us to uncover these porosities and blurred boundaries: they expose life as becoming in a Deleuzoguattarian sense, as non-teleological processes of change, and as intensities that do not compose an external force enlivening inert matter but, instead, are constitutive of matter as such. Uncontainable life is not modelled after the life of the human or any other organism and thus, it is not limited like the life of discrete entities. Rather, uncontainable life dwells in the sphere of the in-between: it is processual, dynamic, and multiplicitous. Furthermore, the concept of uncontainability exposes the excessive character of life: its potential for surplus and transformation that cause life to exceed both the material boundaries of entities and the conceptual frames and established meanings.

My reference to material forces as crucial in the conceptualisation of life that is proposed in this thesis requires a look at the understanding of matter as such. Thus, before I elaborate further on the uncontainability of life, I will briefly contextualise the “working definition” of matter adopted in this project. Since the inception of Western philosophy, the issues of life and matter have been interconnected. As I have already indicated, the question of what constitutes the basis of the universe (or, the material principle of everything) is first mentioned by the Presocratics, who pointed to such factors as water (Thales), fire (Heraclites), air (Anaximenes), and atoms (Democritus). Aristotle is the first to describe matter in a philosophically systematic way as that which exists interdependently with form: matter is like building bricks, which possess a certain potentiality but only by receiving a form may actualise

as a house.³² In modernity, Descartes offers a conceptualisation of matter as an independent substance opposed to mind and characterised by extension.³³ Isaac Newton develops Descartes' mechanistic theorisation of matter by adding to the extension other basic features, such as mass. According to Newton, matter consists of particles characterised by "extension, hardness, impenetrability, mobility and *vires inertia* [forces of inertia]" (Newton 1846, 385). Work on the periodic table and atomic theory in the nineteenth century enable a discussion of matter as composed of atoms and molecules that possess not only mass, but also chemical and electrical properties. The twentieth century brings further insights into the structure and specificity of matter, but they do not translate into one general definition. Rather, each strand of contemporary physics employs its own specific understanding (for example, there are differences between the characteristics of matter described by classical physics, quantum mechanics, and astrophysics).³⁴ The theory of relativity shows that energy (e.g., the kinetic energy of a system) and massless particles (like particles of light, i.e., photons) contribute to the mass of a system, for example a moving body.³⁵ Albert Einstein shows that the mass of a system is equivalent to its energy.³⁶

Quantum mechanics demonstrates that mass is only one among many properties that a particle may have (others being for instance, spin or electric charge (Shapere 2014, n.p.)). In the context of quantum mechanics, it is impossible to describe a particle's momentum and position at the same time (only one of these parameters can be assigned to a particle at a time). Furthermore, two particles may become "entangled", which means that "in the case of two particles that become entangled and separate by a very great distance, an operation on one

³² See: Aristotle, *Physics*.

³³ See: Descartes, *Principles of Philosophy*.

³⁴ See: Shapere 2014.

³⁵ Thus, even massless particles and energy may be seen in this context as forming part of the matter of the system. When examined separately from the system, these elements do not have mass and are not considered to be matter. This is also why it is difficult to achieve a rigorous and universal definition of matter.

³⁶ See: Wald and Adler 2014.

particle will be immediately responded to by a corresponding change in the other” (Shapere 2014, n.p.). This “spooky action at a distance” (H. Born, M. Born, and Einstein 1971, 143), as Einstein calls it, has influenced the twentieth and twenty-first century debates on the understanding of matter.

In contemporary physics, explanations of the structure of matter do not start with the atom and its components: protons, neutrons, and electrons as the minimum building blocks. Instead, it has been shown that there are subatomic particles: fermions (described as particles that cannot occupy the same quantum state, that is, have the same position and spin, at the same time) and bosons (which can simultaneously occupy the same quantum state).³⁷ Fermions, which are associated with the traditional understanding of matter (i.e. matter seen as “impenetrable stuff”), include quarks (which build both protons and neutrons) and leptons (an example of which are electrons). Bosons are often described as particles that carry force, like photons (carriers of electromagnetic radiation) and gluons (which mediate interactions between quarks).³⁸ In other words, bosons form force fields that “bind fermions to each other ... [and can be seen as] the glue holding matter together” (Carroll 2013, n.p.). Particle physics also explains the existence of antimatter, that is, a type of matter that consists of antiparticles. Antiparticles are described as the “anti-counterparts” of particles of matter (Zeller 2014, n.p.). Every elementary particle has its antiparticle, which has the same mass, momentum, and lifetime, while “their electromagnetic properties, that is, charge and magnetic moment, are equal in magnitude but opposite in sign” (ibid.). A particle and its antiparticle annihilate when they come into contact with each other. Thus, the original particle and antiparticle are transformed into either electromagnetic energy or other particles and antiparticles that no longer possess the same properties as the initial pair. An example of such products of annihilation are gamma rays. Annihilation reveals that, along with expansion and growth, decay and destruction form part of the

³⁷ See: Coughlan, Dodd, and Gripaios 2006; D. Griffiths 2008.

³⁸ See: Quigg 2014.

processes of matter's transformation. Although I will not elaborate further on the physical theories of matter and its structure, this brief outline suffices to underline two crucial aspects of the understanding of matter employed in this project: firstly, matter is a non-inert, diverse multiplicity; and secondly, it is constituted through the interaction and mediation of forces that hold particles together and transform matter in a multitude of ways.

My investigation of life's uncontainability consists of two trajectories. Firstly, I concentrate on what I call *the non/living*. The two components of the notion of the non/living: "non" and "living" are separated with a slash. The gerund form of the verb draws attention to the material processuality and dynamics of both an organic and inorganic kind, whereas the slash points to the enmeshment of the living and non-living. Furthermore, the non/living captures the problematic that comes with the bioscientific definitions of life. We can think of agents like viroids, prions, or viruses, the status of which as forms of life is not entirely clear (they need a host cell in order to replicate, which means that they do not fulfil the biological requirement of reproduction in order to be considered a form of life). Another example comes from the fields of chemistry and synthetic biology, in which scientists have created structures or inorganic protocells that meet the four basic criteria of the living.³⁹ Finally, the concept of the non/living draws attention to the ambivalent entwinement of living and dying, and thus exposes one of the key aspects of life's uncontainability. In Chapters Two and Four I discuss sculptures made of living bioengineered animal tissue (by the Tissue Culture and Art Project), which die when they become infected with microorganisms or fungi. However, such contamination carries different

³⁹ In his talk focusing on the creation of synthetic, inorganic forms of life, chemist Martin Hanczyc (2011 cited in: Weinstein 2016) lists the following four criteria: 1) the entity has a body; 2) it metabolises; 3) it reproduces (and passes on inheritable information); 4) it is capable of movement. The question of the necessary criteria for the living forms part of the ongoing discussions on the definition and theory of life in astrobiology (see for instance: Cleland and Chyba 2002; Benner 2010). I address this issue in Chapter Two.

meanings for the different actants⁴⁰ involved in the process: the death of the tissue is accompanied by the thriving growth of the infecting bacteria, viruses, or fungi. Living and dying, growth and decay, overlap in the space and volume of the contaminated bioartwork.

The second trajectory of my examination of uncontainable life focuses on its multiplicitous character. As a force constitutive of matter, life does not remain enclosed in separate, individual, and independent entities, since these entities are not at essence actually autonomous individuals. As Deleuze explains, “The multiple is no longer an adjective which is still subordinate to the One which divides or the Being which encompasses it. It has become noun, a multiplicity which constantly inhabits each thing” (Deleuze and Parnet 2002, 57). He describes multiplicity as that “which designates a set of lines or dimensions which are irreducible to one another. ... In a multiplicity what counts are not the terms or the elements, but what there is ‘between’, the between, a set of relations which are not separable from each other” (ibid., vii–viii). In this context, life can be understood as a multiplicity, a process, and a becoming of matter that illustrates the provisional character of boundaries between entities, organisms, and species. It is not an individual that forms the basic ontological unit, but an assemblage. In Chapter Three, I analyse *May the Horse Live in Me* (2011), a bioartistic performance by L’Art Orienté Objet, in which one of the artists injects herself with horse blood plasma containing a full spectrum of immunoglobulins that are foreign to her organism. By concentrating on the inter-species connection and communication (between the human immunological and hormonal systems and equine blood plasma) taking place in the artist’s body, the project hyperbolises and thus exposes the transspecies character of human and nonhuman embodiments. In both the philosophical and the biological sense, human and nonhuman bodies are transspecies assemblages. To repeat after Donna Haraway, “we have never been

⁴⁰ I employ Haraway’s understanding of actants as “collective entities doing things in a structured and structuring field of action” (2003b, 89). Furthermore, “Actants are not the same as actors ... actants operate at the level of function, not of character” (ibid., 115).

human” (Gane 2006) in the first place. Examples of this are the bacteria, viruses, and fungi living in and on our bodies, without which our organisms would not be able to perform their basic functions or even to survive.⁴¹ The microbiome, that is, “the ecological community of commensal, symbiotic, and pathogenic microorganisms that literally share our bodily space” (Lederberg and McCray 2001, n.p.), includes the bacteria, yeast, and other microbes inhabiting our guts, skin, respiratory system, conjunctiva (a tissue covering the sclera and lining the inside of the eyelids), and different bodily cavities. They play a crucial role in digestion, the production of certain vitamins needed by the host, and the functioning of the immune system, amongst other things. Yet, some of them are pathogenic: in specific circumstances (lowered immunity) they become harmful to the host organism (like *Candida*, which may cause candidiasis, a fungal infection occurring in various areas of the body). Life is not enclosed in separate, isolated compartments. Different bodies, organisms, and species become with each other through interconnections and ongoing negotiations. The AOO project, can be seen as a magnifying glass that exposes the intra-actions between human and nonhuman components of transspecies assemblages: their material interconnectedness, through the processes of differentiation, communication, symbiosis, disagreement, and battle.

1.3. Cutting Concepts

Whereas the TC&A’s project and the notion of the non/living bring to light the blurriness and fluidity of the boundaries between the organic and inorganic, and the processes of living and dying, the AOO performance highlights the multiplicitous character of life, and the myriad ways in which it evades containment. In order to be able to discuss the specificity of life processes and transformations that the artworks undergo, I employ

⁴¹ Biologically speaking, the average human body carries as much as 2 kg of microorganisms and their number exceeds the number of human cells (due to the fact that microorganisms are substantially smaller than human cells, they account for only ca. 1–3% of human body weight. See: NIH Human Microbiome Project 2009).

such notions as “killing” and “dying,” which seem to go against the claim of life’s processuality and uncontainability. These notions – in a similar way as the idea of distinct individuals – are merely provisional cuts that are not permanent or independent of a context. They temporarily separate elements or concepts and simultaneously modulate and modify the material and conceptual assemblage. I employ the concept of the cut in a manner inspired by Eva Hayward’s elaboration in the context of trans* theory. She writes:

The cut is possibility ... My cut enacts a regeneration of my bodily boundaries – boundaries redrawn. Through my cut, I brush up against invocations and revelations; my cut is not passive – its very substance (materially and affectively) is generative and plays a significant role in my ongoing materialisation. My cut is of my body, not the absence of parts of my body. The regenerative effort of my cut is discursive; my transfiguring cut is a material-discursive practice through which I am of my body and of my transself ... My cut is generative within material limits but not with affective fixity, my tissues are mutable in so far as they are made of me and propel me to imagine an embodied elsewhere. (Hayward 2008, 255)

The cut implies the modification, transformation, reworking, and refiguration of boundaries, and the creation of new possibilities. When thought of as a methodological tool, the cut allows one to understand how the procedure of “killing” a semi-living sculpture (in the case of TC&A) does not mean the eradication of life or the imposition of a definitive borderline between the state of a “living artwork” and “dead matter.” Instead, “killing” (by, for instance, placing the piece in a non-sterile environment, and thus allowing its contamination with microorganisms) is a cut that transforms the assemblage, modulating and modifying the ongoing processes of materialisation: it emphasises the interconnection between the dying of the tissue (of which the sculpture is made) and the thriving of the contaminants (the fungi). The cuts form part of the assemblage and, thus, of its ongoing processuality in both a material and conceptual sense. It is through these cuts that one is able to discern specific components of the assemblage, while keeping in mind that the

boundaries of these components (of bodies, of subjects and objects, and of concepts) are provisional. In this way, cutting is a material-discursive practice that not only modifies and alters bioartistic projects, but also transmutes life, while opening it up for further materialisations and theorising.

2. On Bioart

Having outlined the key philosophical aspects of this project, I will now sketch the contours of bioartistic practices and their historical and cultural context. Present-day natural sciences and biotechnologies recompose and reformulate the body and its meaning in multiple domains; for example: evolution, social relations, health, and reproduction. This is one of the reasons why artists employ biotechnology not only on the level of discourse and critique,⁴² but also on a material level by employing biotechnology as a material means of artistic expression and knowledge production. However, the presence of artists in a space reserved for science (especially biology and medicine) is not new. It suffices to recall that, throughout the centuries, often-anonymous artists illustrated countless specimen organisms, both alive and dissected in the name of modern science.⁴³ According to Robert Mitchell, what distinguishes bioartists in this context is the medium – living matter itself. Furthermore, he underlines that the employment of typical scientific “framing” devices like transparent tubes, petri dishes, and glass or plastic containers intensifies the conflation between presentation and representation and, thus, produces ambiguity around the status of the artwork.⁴⁴ Moreover, in

⁴² Robert Mitchell remarks that the field of contemporary art which deals with the problematic of biotechnology without the use of biotechnological means in the creation of artworks (that is, in a form of representation and not presentation of the problem) may also be seen as a specific form of bioart: “prophylactic bioart”. He, thus, distinguishes two kinds of bioart: prophylactic and vitalist (Mitchell 2010, 16–36).

⁴³ These sort of traditional artistic representations of unusual life forms/specimens often served as a means of strengthening the distinction between “normal” and “deviant” (Kac 2007b, 9)

⁴⁴ Mitchell underlines that the supposed separation formed by the frame between an artwork and a viewer may paradoxically create an experience of shared commonality of

practically all cases, the sustenance and survival of bioartworks could not take place without the laboratory frame: petri dishes, sterile containers, adequate conditions, lab protocols, and the like.

2.1. Bioart: a Background

Although it is difficult to pinpoint a date that marks the beginning of the use of biological material in artistic practices, several authors mention the 1930s.⁴⁵ It was in this decade that Edward Steichen⁴⁶ first employed genetics as an art medium. Relatively early on, similar means were also used by George Gessert.⁴⁷ Both artists showed their creations in galleries: the organisms that they had earlier modified. The use of bio-materials (e.g. bodily fluids like sperm, menstrual blood, and urine) was very present throughout the twentieth century in Western art; for instance, in the form of body art and performance (e.g. Ana Mendieta, Carolee Schneemann), the so-called ecological/environmental art of the '60s,

living, breathing, and enfleshed materiality. His argument for the artistic framing of vitalist bioart relies on three aspects: the impact of the tradition of the “readymade” (the concept coined by Marcel Duchamp in order to describe the practice of reframing industrially manufactured items by placing them in an art gallery space; in this way, the art space serves as a medium that transforms these objects into artworks); the influence of performance art (which aims to “expand the contexts in which ‘art’ could occur by extending art beyond the space of the art gallery” (Mitchell 2010, 81) and blur the boundaries between art and life); and, finally, Kant’s understanding of the artistic framing “not solely as a border that ‘contains’ the content of the work, but also as a vector that allows the materiality of the work of art to infect the spectator” (ibid., 86). Drawing on Kant’s ideas, Mitchell argues that the frame (e.g. the container in which a bioartwork is placed) links the spectator to the object and produces “a sense of embodied oscillation” (ibid., 88). Furthermore, he claims, the transparency of the frames employed in vitalist bioart “fundamentally emphasizes the common media – for example, air – that potentially link the spectator with the living matter that is at the center of the work of art. The relative fragility of these frames thus serves as a vector for illuminating the fragility of our own embodied ways of framing our surroundings through the membranes of the skin, eyes, lungs, and stomach.” (ibid., 90).

⁴⁵ See e.g.: Kac 2007b; Mitchell 2010; Reichle 2009.

⁴⁶ Edward Steichen (1879–1973) made new organisms, flowers (delphiniums), by the means of hybridisation and the use of chemicals. He is thought to be the first artist to express the idea of biology as a medium.

⁴⁷ George Gessert (born 1944) is well-known for his hybridised irises; he is often mentioned as both a pioneer and a critic of bioart.

‘70s, and later (e.g. Alan Sonfist, Jackie Brookner), or translations of the genetic code into conceptual art/music (e.g. Aurora Sánchez Sousa and Richard Krull).

Thinking through the overlap of bioart and performance, particularly how the artificial and the technical have affected artistic performance (and vice versa), Christian Salter (2010) uses the idea of entanglement. In Science and Technology Studies (STS), the notion of entanglement was first introduced by anthropologist Nicholas Thomas (1991) in his discussion on the economy of markets. As Arie Rip notes, in this context, entanglements can be described as “‘associations that last longer than the interactions that formed them’ (Callon & Latour 1981, 283) ... [and in which] actors and activities can become mutually dependent: they cannot move independently anymore ... [Entanglements are] an always precarious outcome of interactions and processes” (Rip 2010, 381). While giving an extensive account of how human and nonhuman (in his context, mostly technological) embodiments and material-semiotic processes are deeply intertwined, Salter also positions his project in relation to Judith Butler’s concept of performativity and Barad’s posthumanist and agential-realist account. In Barad’s work, agency is no longer understood as a feature possessed, or not, by human actors. Instead, she transforms the term into “agentiality,” which she argues is a “doing” and “intra-acting,” an unfixed and non-anthropocentric process, and an enactment. Salter also draws attention to Varela’s conceptualisation of “enaction” framed as “the performance or action of ‘bringing forth of a world’ based on the fact that we are a sensimotor-based embodied agent in which meaning emerges through a continually historical process of ‘active living’” (ibid., xxvi–xxvii). By mobilising these concepts, Salter analyses artistic performance both in its broad context and as a particular, non-representationalist mode of knowledge production. He argues that it is an enaction, a doing, and a materiality that is concerned with dynamic forces, processes, change, immanent experience, and the temporal dimension of the present, and that it avoids the prioritisation of the human (ibid, xxiii). In this way, performance appears as an embodied, enfolded, and affective way of knowing, in a

non-representationalist manner, very much in line with Deleuze and Guattari's (1994) understanding of art that proceeds through the production of percepts and affects (that is, intensities that – unlike perceptions and affections – are not ascribed to individual subjects). As Deleuze explains, "Percepts aren't perceptions, they're packets of sensations and relations that live on independently of whoever experiences them. Affects aren't feelings, they're becomings that spill over beyond whoever lives through them (thereby becoming someone else)" (Deleuze 1995, 137).

The entwinement between living bodies and technologies, resulting in material effects at the level of the skin (pain, self-mutilation, amputation), has been present in performance art since the 1960s. Generally, this sort of artistic expression has been called "body art." Among the most well-known practitioners, one may find: Gina Pane, Marina Abramović, Valie Export, Carolee Scheemann, the Vienna Actionists, Chris Burden, Ron Athey, Orlan, and Bob Flanagan.⁴⁸ What is striking in most of these cases, however, is that the body, inflicted pain, or alteration are used as (in)direct tools of socio-political/cultural protest.⁴⁹ Even if such protest does not constitute the main goal, the attention and artistic enquiry do remain focused at the level of the human body. The character of their questions and their main artistic interests (despite sometimes very similar practices in a "technical" sense) may be seen as the features that allow critics to distinguish between the two interconnected currents in contemporary artistic practices: bio- and body art. In the case of the biological arts, it is no longer the artist's body

⁴⁸ This list is of course long and I am not aiming to be comprehensive here. One could add: Stelarc, the character of whose works has changed a lot throughout the years; some of the representatives of the neo-primitive (or modern primitive) radical body modification movement, like Fakir Mustafar (often perceived as the father of the movement); representatives of the body hacking movement, e.g. Lukas Zpira and Satomi (see: Zpira 2011), Emanuel Lacoste (see: Lacoste 2008); and such performance/body art collectives as Kollektif ART-KoR or SUKA-OFF (SUKA OFF 2004).

⁴⁹ For example, through their projects (actions), the Vienna Actionists (Günter Brus, Otto Muehl, Herman Nitsch among others) targeted the socio-political climate in post-war Austria. See also: Salter 2010, 244–245.

enacted as a site of protest, contestation, and critique of various power structures that is at stake. The methods employed in bioart are formed as hybrids of both an artistic and a bioscientific/biotechnological kind. Bioartistic projects often involve procedures conducted at a microscopic level (of cells and tissues), the “beyond-the-skin” level of various embodiments. I write “beyond-the-skin” and not “under-the-skin” level because not all bioartworks include the modification of an organism (or the fragments of it) that has developed skin in technical terms.⁵⁰ In this way, bioartists such as the Tissue Culture and Art Project aim to critique the body-centrism that is present in theory and art.⁵¹ TC&A’s works involve the use of cells and bio-engineered tissues: the sculptures they create are semi-living fragments (tissues grown on biopolymer scaffoldings) that do not form an enclosed, autonomous body, or even an organ. One could rightly claim that if we speak about cells or tissues, we are still dealing with bodies in a certain sense, however micro- they may be. But, the hegemonic understanding of the body, that is, the body as one macro-whole, is still prevalent in both theory and culture, broadly speaking. Finally, the questions raised by bioartists are often focused on the ontological and ethical aspects of life itself and the “management” of living matter (manipulation, appropriation, and exploitation) within contemporary technoscientific and socio-political contexts.

In contemporary bioart – in contrast to Steichen’s hybridisation of plants – the actual manipulation, hybridisation, and interference take place at the molecular level (e.g. genes, proteins, cells, tissues) and concern “bits of life”.⁵² Bioartist Eduardo Kac⁵³ identifies three

⁵⁰ Bioart projects that involve the use of microorganisms are an example of this. For instance, in the piece entitled *Genesis* (1998/99), Eduardo Kac utilises genetically-modified bacteria. See: Kac 2000a.

⁵¹ See: TC&A, The Tissue Culture and Art Project, n.d.

⁵² The expression “bits of life” is the title of Nina Lykke and Anneke Smelik’s book which problematises contemporary understandings of life and its position in philosophy, culture, and science through the lens of feminist cultural studies of technoscience (Lykke and Smelik 2008).

⁵³ Kac is particularly well-known for the creation of a fluorescent rabbit named *Alba* (see: Kac 2000b). He is also the editor of several publications on bioart and new media (e.g. Kac 2007a; 2007b).

approaches that may be employed by a bioartist (separately or in combination). The first involves the coaxing of biological materials into particular immutable shapes or compartments; the second consists of the unconventional use of biotechnological tools and procedures; and the third leads to the “invention or transformation of living organisms with or without social or environmental integration” (Kac 2007b, 18). Thus, he argues, bioart appears as an unprecedented art form: “literal life-based creation” and an art happening *in vivo* (ibid., 19).

Although the distinction described above between body art and bioart serves a strategic purpose in the art world (for example, framing a piece or an exhibition as the examples of bioart signals to the audience what medium, techniques, and context may be at stake), it is also intrinsically problematic. Firstly, such a division implies a specific progress narrative with regard to the technologies employed in the projects: it distinguishes between less advanced medical and surgical techniques used by artists such as Orlan, who focus on body modifications, and the more developed biotechnologies, such as tissue or genetic engineering, employed by Kac and TC&A. Secondly, approaching this distinction as though it were a sharp one would suggest that there is a substantial difference between human and nonhuman bodies and materialities. This is not true, since, as I have already mentioned, human bodies are always already nonhuman. Finally, there are projects that involve the modification of an artist’s body by means of biotechnological techniques, such as Stelarc’s *Ear on Arm* (a bioengineered ear implanted on the artist’s arm)⁵⁴ or AOO’s *May the Horse Live in Me*. These projects blur the boundary between the two categories and refuse to remain contained within either of them. This is also why the absolute distinction between these two strands does not seem to be valid. Instead, they could be seen as two points situated along the spectrum of artistic engagement with biological materiality (whether in the form of a human body or fragments of tissues, cells, and their micro-structures), with different artistic projects being placed somewhere between these two points. In this way, we can avoid the risk of repeating

⁵⁴ See: Stelarc 2011.

the narrative of technological progress, on the one hand, and drawing an arbitrary division between human and nonhuman embodiments, on the other.

Only very few contemporary bioartistic projects happen at the level of complex organisms. And even when this is the case, the stake of the artistic engagement is usually found at the micro-scale of the bits of life: cells or tissue cultures. The fact that it is taking place on or in multicellular organisms is often erased or avoided. Their role is reduced to being the resource providing the cells and fragments of tissue needed for the realisation of the project.⁵⁵ Bioartists often create absurd art pieces: the supposedly cruelty-free manipulations of the living bits (since these are in commonly understood as mere fragments or microorganisms) may in fact conceal and push away real “animal-big-like-us”⁵⁶ victims; and this is indeed the case in any project that involves tissue engineering. Violence is merely being transposed onto less visible, or less relatable levels. The question of the victimless-ness of present and future scientific (and scientifico-artistic) practices and of the in-advance broken promises of a technoscientific utopia form some of the main themes in the series of works *Victimless Utopia* by the Tissue Culture and Art Project (to which I return in detail in Chapters Two and Four). As such, the artists employ irony as a strategy that generates meaning:⁵⁷ by narrating their projects as

⁵⁵ The idea that one is only dealing with “fragments” of life, not the fully developed organism, helps to create a distance between the research subject (artist) and the research object: bits of the non/living.

⁵⁶ First used by Margulis, this expression was popularised by Myra Hird in her critique of anthropocentrism and human ignorance about those organisms with which one finds it difficult (or impossible) to identify (e.g. not-big-like-us bacteria) (Hird 2009).

⁵⁷ Irony (from the Greek *eironeia*, meaning “dissimulation, assumed ignorance,” see: Harper 2004a) is a rhetorical and literary device, in which “the real meaning is concealed or contradicted by the literal meanings of the words (verbal irony) or in a situation in which there is an incongruity between what is expected and what occurs (dramatic irony)” (The Editors of Encyclopaedia Britannica, n.d.). Throughout history, the definition and status of irony have changed. As Colebrook (2004, 6) notes, the first important instances of the use of the word *eironeia* appear in Plato’s dialogues with reference to Socrates. In both its Socratic and contemporary sense, the employment of irony relies “on distinguishing between those statements and actions that we genuinely intend and those that we repeat or mime only to expose their emptiness” (ibid., 2).

visionary in scientific and technological terms, and as governing life in its biological sense, they in fact prove the opposite. Failure forms part of their endeavours, and life appears to be neither entirely controllable, nor containable.

2.2. Selecting the Artworks

As I note in the opening of this introduction, the field of bioart is diverse and the common denominator of bioartworks is their medium: biological substance, that is, living organisms or their fragments. In 2008, theorist Pier Luigi Capucci proposed a chart illustrating the relations between different forms of art focused on the living in its organic and inorganic sense. According to this chart, bioart includes four specific sub-areas: biotech art (involving the use of biotechnology in the broadest sense), transgenic art (involving genetic engineering, and being itself considered a sub-field of biotech art), synthetic biology, and biorobotics.⁵⁸ Capucci's classification is one of the possible ways of assessing the diversity of the field and I invoke it here only to underline this heterogeneity.

The selection of bioartworks analysed in this dissertation – the semi-living sculptures created by The Tissue Culture & Art Project (*Victimless Utopia*, in particular) and *May the Horse Live in Me* by L'Art Orienté Objet – was based on several factors. In contrast to a significant number of bioart projects, which tinker with the genetic material of various organisms and prioritise the notion of DNA as the “code of life,” which coincides with popular-scientific narratives on genetic reductionism, TC&A explores life in a different manner: as a force of transformation and becoming of various organic elements (cells, tissues, microorganisms) in their entwinement with each other and their physical and chemical milieu. Furthermore, TC&A links its projects in a playful and acute way to the cultural imaginary of technoscientific utopias, in which nature is subordinated to the management of science, technology,

⁵⁸ The chart was revised in 2013 after a discussion between Capucci and artists Laura Beloff, Erich Berger, and Terike Haapoja. As a result, the areas of synthetic biology, artificial life, and robotics were included in the chart. See: Beloff, Berger, and Haapoja 2013.

and culture, on the one hand, and where science provides new solutions to our current ethical dilemmas (for instance, enabling the manufacturing of animal products, such as leather and meat, without killing animals), on the other. The TC&A artists reveal the problematic character of the logic that drives such technoscientific dreams: biological matter is manipulable only to a limited extent and often cannot be contained within the frames of the scenarios planned by scientists and artists. Through their projects, they also call for a more careful approach to technoscientific solutions to ethical problems: at this point the production of “victimless” meat (broadly, the procedure of animal tissue engineering) requires the use of an animal by-product: foetal bovine serum, and thus undermines its victimless status. It is important to always ask what, or rather, who, is excluded from the stories we are told. By its focus on the negotiations between human and equine blood, *L’Art Orienté Objet’s* project hyperbolises and, thus, reveals the transspecies character of any living being (human and nonhuman alike). In their own specific ways, both TC&A and AOO “stay with the trouble,” as Haraway (2010) puts it. They expose the entwinement between the living and non-living and the human and nonhuman. This, however, does not take place without the (ab)use of nonhuman life and, in this way, underscores the hypocrisy of humans’ approach to the living (in both the ontological and ethical sense). Finally, both TC&A’s and AOO’s bioart projects have a unique aesthetic quality, and here I use “aesthetic” in a Deleuzoguattarian sense.⁵⁹ They both capture the forces of becoming of living matter in the form of affects: non-personal, inhuman intensities that influence the materiality of other bodies, including the bodies of the viewers (myself among them). In other words, both the “extra-discursive and extra-textual” (O’Sullivan 2001, 126) aspects of the bioart projects, which are linked to the experience of their visual form, are just as significant to my selection procedure as is their critical and philosophical potential.

⁵⁹ I discuss Deleuze and Guattari’s and Grosz’s understanding of art in Chapter One.

2.3. Bioart and Synthetic Biology

In bioart – as it is described by both artists and critics – it would not be possible to articulate the artistic ideas without engaging with scientific procedures, protocols, and operations. Whereas scientists tend to be more goal-oriented, artists focus on the process, on that which “disrupts” the planned scenario, on unexpected (and supposedly unproductive) alterations, on clashes in methods. They are often aware that engaging with biotechnologies carries “the potential (even against the artist’s will) to become the cogs in the future propaganda machine” (Catts and Zurr 2012a, 150). Creating bioartworks does not happen in a vacuum. Bioartistic projects are intrinsically embedded in a multiplicity of relations (e.g. with technoscientific, political, and cultural institutions). Moreover, the emergence and proliferation of bioart is linked to the biohacking movement (which involves practising biology with DIY equipment and hacker ethics, often combined with a call for the democratisation of science and technology) on the one hand, and to synthetic biology and biodesign, on the other. Synthetic biology is a relatively new field of research and practice that involves manipulating non/living substance, often using principles of engineering. Representatives of the field like to compare themselves to the DIY innovators of the 1970s and 1980s who created the first personal computers, which later led to the rise of the new computer industry (Ginsberg et al. 2014, x). Aside from biologists, synthetic biology attracts chemists, engineers, computer scientists, and physicists, most of them united in their belief in the possibility of full control over the living (or at least as much as over any other materials one engineers). As Alexandra Daisy Ginsberg, et al. note, “This vision of a biology transformed into a medium and material for design is accompanied by grand rhetoric of a world-changing, world-saving green technology” (2014, xi). The arguments for the development of synthetic biology often paint a vision of the sustainable production of fuel, novel pharmaceuticals, and medical technologies as well as novel ways of producing food or garments. Yet, the current state of the field seems to suggest that it may follow the path

of the first generation of industrial biotechnology: it could become a myopic producer of waste and a powerful actant in the game of biotechnological corporations (Ginsberg et al. 2014, xiv). Several of the contributors to the volume *Synthetic Aesthetics* (2014) suggest that perhaps having artists and designers engage with the tools and materials of synthetic biology may open up a space for a critical and creative engagement with life – not as a raw material to be exploited, but as an entity with which to think and help us explore our relationship with the living and the nonhuman in general. As Catts and Zurr remark, at least some “artistic expressions that are more subtle and complex will be able to offer glimpses of the possible and the contestable; works that are neither utopic nor dystopic, but rather ambiguous and messy, acting to counter the engineering hubris of control” (Catts and Zurr 2014, 37).

3. Chapter Summaries

This dissertation consists of four chapters. In the opening chapter, I present the philosophical premises of this project, which allow me to argue for thinking with and through bioart as a biophilosophical undertaking that contributes to our understanding of life. In the subsequent chapters (Two, Three and Four), I analyse a selection of bioartworks that expose an ontology of life as processual, multiplicitous, and always already uncontainable in both its material and conceptual sense.

Chapter One, “Feminist Theory and Biophilosophy”, sketches the theoretical context and background of the dissertation: it maps out the feminisms concerned with thinking “beyond the human” (which I provisionally call “posthumanist feminisms”) and details the major problematics associated with them: matter (and its relation to meaning), human/nonhuman relations, and difference. For this project, the most pertinent strand of feminism is the one that addresses Deleuze and Guattari’s approach to the questions of life, becoming, difference, and multiplicity. This is represented particularly in the works of Braidotti, Colebrook, and Grosz, among others. Furthermore, I look at how the two

areas of contemporary theory concerned with the issue of the living, that is, biopolitics and neovitalism, contextualise the question of life in relation to current ethico-political problematics (linked to the use of biotechnologies, for instance) and provide conceptual tools that – when combined with the feminist framework – allow for an examination of the ontology of life revealed through the analysed bioart projects. Finally, I argue for an aesthetic understanding of bioart as a transdisciplinary practice that captures the forces of the non/living in the form of sensations, while simultaneously bolstering the creation of philosophical concepts.

Chapter Two, “Towards the Non/Living,” discusses the ontological premises of life as they are exposed through the hybrid practices of a selection of bioartworks by the Tissue Culture & Art Project. It also provides an account of the scientific, artistic, and philosophical contexts of these premises. The ontology that emerges through these bioart projects may be described as always processual (in this sense, it converges with the work of Deleuze and Guattari, Braidotti, Colebrook, and Grosz, among others). Subsequently, I address the link between this view of ontology and the understandings of matter as dynamic, of movement, and of life. I propose the concept of *uncontainable life* as perhaps a more adequate approach to understanding the ontology of life. The concept of uncontainable life exposes the processual, dynamic, and multiplicitous character of life; it problematises the common idea of life as organic; it troubles the sharp distinction between the living and non-living, and living and dying (thus, suggesting these are processes understood in terms of becoming rather than being/non-being); and finally, it accounts for the potential of surplus expressed through material transformations. Moreover, I suggest that the entwinement of life and death, and the organic and inorganic should not be considered as distinct components of uncontainable life, but instead, as *the non/living*, where the slash exposes the enmeshment of these processes.

In Chapter Three, “Transspecies Assemblages,” I concentrate on *May the Horse Live in Me* by L’Art Orienté Objet. This project reveals the issue of the multiplicity of transspecies embodiment, understood as a

dynamic and fundamental element of ontology. Deleuze and Guattari's concept of the *assemblage* enables an analysis of the factors, processes, forces, interconnections, and conflicts at stake. An assemblage refers to a multiplicity of heterogeneous elements that have the capacity to affect other elements and be affected by them, form alliances and connections, communicate, and enter into conflict with one another. Furthermore, components of an assemblage may connect with elements external to this particular collective and thus enter other assemblages. Equine immunoglobulins (which originally formed part of the body of a horse), when injected into the organism of the artist, form a new assemblage with human cells and other nonhuman components. In this newly composed transspecies assemblage, interactions between its components are different than before the injection: human and nonhuman elements exercise their capacities differently. The AOO's project brings to light the transspecies character of embodiment: organisms – being themselves assemblages of various components – form part of larger assemblages. These components become with each other by forming alliances, interconnections, and disagreements. Transspecies embodiment that exceeds the fixed frames of distinct entities can thus be seen as one of the key expressions of uncontainable life.

Chapter Four, “Uncontainable Life”, focuses on the question of the uncontainability of life and living processes and the material and discursive intertwining of issues like transformation, value, and waste. It takes as its point of departure an exhibition of *The Victimless Leather Jacket* by the Tissue Culture and Art Project, during which the artwork was contaminated by fungi and “died,” or had to be “killed.” The chapter brings together two aspects of life's material and conceptual uncontainability: (1) the entwinement of living and dying and the organic and inorganic, expressed through the non/living of the examined artwork, and (2) the multiplicitous character of transspecies assemblages, in which the material forces of becoming that comprise both growth and composition as well as degeneration and decay exceed the presumed boundaries of organisms and species. The analysis of *The Victimless Leather Jacket*, the related practices of tissue engineering (which form a

central part of TC&A's methodology), and my own experiences in a bioartistic laboratory allow me to address the questions of control over life, the necessary failure thereof, and, finally, the specific sensations produced through a messy engagement with the bits of (uncontainable) life.

In the Conclusion, I review my claim that bioart is a biophilosophical practice by looking at how the selected projects support an understanding of life that is not reduced to a limited set of criteria or a single essence. The examined bioartworks reveal the porous and provisional character of boundaries between entities and processes. They expose life as the non/living: an enmeshment of the organic and inorganic, living and non-living, and growth and decay. Life does not remain enclosed within distinct individuals. Rather, it is a material force of differentiation exceeding any prescribed frames. Furthermore, it is not a discrete entity that forms the basic ontological unit, but, instead, an assemblage: the collective of different components, their interconnections, interactions, and transformations. In this way, I argue, doing biophilosophy through bioart helps us to think life as material, processual, non-anthropocentric, and, most importantly, *uncontainable*. Finally, my hope is that such an ontological reconfiguration might in the future open up a path towards thinking a non-anthropocentric ethics.

Chapter 1

Feminist Theory and Biophilosophy

1. From Matter to Affect

The problem of life – as it has been conceptualised throughout the history of Western thought and in contemporary feminist theory – has been closely interlinked with questions about matter, the subject, and difference. In this chapter, I investigate how the understanding of matter, intertwined with these issues and the related questions of affect and human/nonhuman relations, is theorised in the work of contemporary feminist thinkers and how these conceptualisations facilitate my analysis of the selected bioartworks. Subsequently, I focus on two approaches to the question of life in twentieth and twenty-first century philosophy: biopolitics and neovitalism, which contribute to my argument that life is uncontainable. Finally, I concentrate on the relation between three areas of thought, creativity, and knowledge production that intersect in the field of bioart; namely: philosophy, science, and art.

1.1. Matter and Feminist Theorising

As I indicate in the Introduction, the question of matter has occupied Western philosophy since its inception in ancient Greece. Here, I would like to briefly mention several of the key philosophers whose theories of matter have shaped traditional cultural understandings. It is this body of thought around the philosophical question of matter that has been both critically evaluated and rethought by poststructuralist, feminist, and postcolonial scholars, among others. What is primarily at issue is the dualism that has been present in philosophy since the Pythagoreans. As Aristotle states in *Metaphysics* (1.986a21-34), it is the Pythagorean school that proposed “the table of opposites”, a table that enlists ten “principles” – “contrarities” (i.e. pairs of opposites) arranged in two

columns: “limit and unlimited, odd and even, one and plurality, right and left, male and female, resting and moving, straight and curved, light and darkness, good and bad, square and oblong” (1.986a23-26). Each pair comprises a “good” and a “bad” term, as Sabrina Lovibond (2000, 16) notes, which results in ascribing a positive value to one column, and a negative value to the other. The presence of the male–female opposition (where “male” is placed in the positive column of the table and “female” in the negative one) constitutes the foundation of the gendered conceptual structure that underlies Greek rationalism, as Lovibond (*ibid.*) highlights. I would add that this gendered structure forms part of the dualistic tradition in philosophy in general. This is also why the terms in each of the columns of the Pythagorean table are often thought together.

In Plato, there is a distinction between mere, changing matter (the world we apprehend) and ideas (or forms), which are immaterial and exist beyond space and time. It is ideas that have true reality and the material world is only their shadow. Aristotle revises this conception by describing ideas as coexisting with passive matter, to which they give both shape and real existence. In modern times, Descartes talks about two distinct substances: immaterial mind and mechanistic body. The dualism of mind and body is also present in the philosophy of Kant, who furthermore offers the conceptualisation of the rational, autonomous, and active human subject.

The split between the two different ontological substances, aspects of reality, or categories, which are hierarchically ordered and asymmetrically evaluated, in its various incarnations, constitutes the blueprint of Western philosophy. The divide takes different forms: spirit–matter, mind–body or soul–body, active–passive, human–nonhuman, self–other, man–woman, presence–absence, and culture–nature, where the first term is always ascribed higher value than the second. Furthermore, the superior terms in these pairs are often associated with one another (as in the Pythagorean table): for example, man is associated with spirit, mind, culture, and that which is specifically human and active. In a similar way, the subordinate terms are also frequently thought together: woman is linked to matter, body, nature, and passivity. These

associations reinforce both the power differential and the hierarchy between the two elements of each pair. Structuralist and poststructuralist philosophers in their investigation of meaning describe this split as a “binary opposition”: an opposition between two exclusive terms, organised according to a “violent hierarchy,” where “One of the two terms governs the other (axiologically, logically, etc.), or has the upper hand” (Derrida 1981, 41). Although the meaning of the first term is constituted by the exclusion of the second, it is the former that becomes the measure of everything. The power hierarchy characteristic of binary oppositions may be exemplified by the opposition of man–woman or masculine–feminine, where the masculine constitutes the standard (for instance, in language).

As sexual difference theorist Luce Irigaray⁶⁰ indicates, women and the feminine have historically been associated with nature and inert matter, and denied the position of the (full) subject, while simultaneously forming an indispensable support for the One as the negation of it (thereby drawing its boundaries). She points out that Western philosophy and culture rely on the ontology of the (masculine) One (where the Other is seen as not-One) and it is only by rethinking it as based on “at least *two*” (Irigaray 1996, 37) sexes, male and female, that a change might be possible. This does not mean that Irigaray evades dualistic thinking; rather, she seeks to deconstruct and refigure the relation between the two elements of the opposition in such a way that each of them is different and unique (and, therefore, they are no longer a binary opposition). This also means that they are not hierarchically arranged and that one element

⁶⁰ Irigaray’s oeuvre (like the writings of other sexual difference theorists) is indebted to the ground-breaking work of Simone de Beauvoir in her book *The Second Sex* (2010), published in France in 1949. De Beauvoir demonstrates that under patriarchy woman is constructed and defined as the Other of man: “Humanity is male, and man defines woman, not in herself, but in relation to himself; she is not considered an autonomous being. ... she is nothing other than what man decides; she is thus called ‘the sex,’ meaning that the male sees her essentially as a sexed being; for him she is sex, so she is it in the absolute. She is determined and differentiated in relation to man, while he is not in relation to her; he is the inessential in front of the essential. He is the Subject; he is the Absolute. She is the Other.” (2010, 35)

of the opposition is no longer described as the negation of the other. As Irigaray writes,

for woman it is not a matter of installing herself within this lack, this negative, even by denouncing it, nor of reversing the economy of sameness by turning the feminine into the *standard for “sexual difference”*; it is rather a matter of trying to practice that difference. Hence these questions: what other mode of reading or writing, of interpretation and affirmation, may be mine inasmuch as I am a woman, with respect to you, a man? Is it possible that the difference might not be reduced once again to a process of *hierarchization? Of subordinating the other to the same?* (Irigaray 1985, 159; italics in the original)

Nevertheless, Irigaray’s work is read by some scholars as an instance of biological essentialism (and thus, preserving the traditional dualism that she strives to undermine). As Helen Fielding notes, the question of Irigaray’s essentialism is more complex:

the uneasiness over her [Irigaray’s] prioritizing of sexual difference remains, since this prioritizing can only be grounded in the “universality” of a sexual difference rooted in nature, which suggests not only a heterosexual bias, but also a discounting of other differences such as race and class. This uneasiness, I would argue, arises out of an inherited cultural understanding that posits nature either as unchanging organism or as matter that can be ordered, manipulated and inscribed upon. Hence, the concern over essentialism is itself grounded in the binary thinking that preserves a hierarchy of the One over the Other, mind over matter, culture over nature. Merely emphasizing the other side of the dichotomy, that of culture, does nothing to break open the dichotomy itself. (Fielding 2003, 1)

Irigaray demonstrates that in both philosophy and culture sexual difference between man and woman, that is, between One and the Other, is in fact the difference between One and not-One. Therefore, it is “sexual indifference” (Irigaray 1985). In other words, “*the feminine occurs only within models and laws devised by male subjects*. Which implies that there are not really two sexes, but only one. A single practice and representation of the sexual” (Irigaray 1985, 86; italics in the original).

By prioritising sexual difference, Irigaray seems to dismiss or take for granted another key differential: the difference between the human and nonhuman (in a similar way that traditional ontologies approach sexual difference). This is also why, Jami Weinstein (2008) argues, Irigaray's notion of sexual difference should be read, not as a fundamental ontology, but as a philosophical concept in a Deleuzoguattarian sense, that is, as created in order to deal with certain problems (the problem of sexism, for example). As a concept, it does not describe metaphysical foundations, but rather, exposes a logic: the logic of the One that has governed Western philosophy and culture and that has established an asymmetry between man and not-man (i.e. woman), and, by extension, as Weinstein argues, between human and nonhuman. Yet, as a concept, it may be "inventive: creating new concepts, new questions and new problems" (Colebrook 2000, 114 cited in Weinstein 2008, 22).⁶¹ In this way, Weinstein continues, by exposing the logic of the One, the concept of sexual difference helps us unpack the anthropocentrism and speciesism of Enlightenment Humanism, transform the logic of the Two (man and woman) into a logic of fluid multiplicity (based upon the idea of horizontal difference), and, as a result, arrive at a fundamental transspecies zoontology. Weinstein's argument acknowledges the contribution of sexual difference theory to the understanding of human ontology and simultaneously shows how sexual difference as a concept elucidates the logic of anthropocentrism and speciesism that is critiqued by posthumanist feminist scholars.

Feminist poststructuralism offers diverse critiques of dichotomies related to gender, sexuality, race, ethnicity, class, and other power differentials. A major part of these necessary and crucial (in both philosophical and ethico-political terms) analyses tends to prioritise the questions of language, meaning, and discourse over the material, even if

⁶¹ Concepts, according to Deleuze and Guattari (1994, 23), are "centers of vibrations" and thus, "due to the vibrations and forces within the concept itself, it [sexual difference] evokes an event that helps create future concepts to better resolve the problems to which it was originally linked" (Weinstein 2008, 23).

they investigate the issue of the body.⁶² Although feminist theorists have been investigating the issues of science, scientific methodologies and objectivity, and the nature–culture dichotomy since the 1980s (Sandra Harding and Donna Haraway being prime examples), it is in the 2000s and 2010s that matter (including the materiality of the body) and its capacity to act have taken centre stage in both feminist theory and other strands of critical enquiry (for instance, STS, object-oriented ontology (OOO), and speculative realism).⁶³ Feminist philosophers, cultural studies theorists, and science studies scholars theorise matter as being, not inert and moulded by language and meaning, but instead as capable of engendering affects and effectuating events. Numerous authors working in this tradition have underscored the agency of matter, which is distributed among human and nonhuman actants and exerts itself at the level of matter as such.⁶⁴

Barad offers the theory of agential realism built on Niels Bohr’s philosophy-physics. Drawing on the insights of both quantum physics and poststructuralist theories, she defines matter as a “*substance in its intra-active becoming – not a thing but a doing, a congealing of agency ... a stabilizing and destabilizing process of intra-activity*” (Barad 2007, 151; italics in the original). In this way, matter is understood as a “discursive production,” which means that, from this perspective, the

⁶² This tendency is often exemplified by the work of Judith Butler (1990; 1993). For a critique of her account of matter, see e.g. Barad, 2007.

⁶³ Weinstein argues that not all of these investigations are equally emancipatory or innovative, and this becomes particularly visible in their accounts of ethics. She offers an acute critique of OOO and its representatives’ flattened version of ethics, which ascribes equal value and importance to things, humans, and nonhumans (see e.g. Bogost, 2012). As Weinstein writes, “ethics require(s) some sort of decision about who or what we regard as valuable and – contra OOO – our world is never given in a flat manner, but is always both specified within an event or assemblage, and specified from a position of what or who we deem to be worthy of consideration. ... Indeed, for the marginalized or oppressed other, there is no escape from devaluing affects.” (2016).

⁶⁴ For example, Jane Bennett (2010) provides an excellent analysis of the North American blackout; Stacy Alaimo (2010) examines the entwinement between the environment, toxic substances, and bodies that are exposed to them; and Astrid Schrader (2010) focuses on the agency of *Pfiesteria piscicida* (“the Fish Killer”), a species of dinoflagellate that causes harmful algal blooms.

materialisation of bodies and the production of meaning are interdependent. According to Barad, discursive practices are not exclusively of human kind or limited to the realm of cultural and linguistic representations and performances. Instead, she suggests, they should be understood as “(re)configurings” (ibid., 148) and intra-actions of the world through which different elements and entities, subjects and objects emerge. She proposes the concept of the *phenomenon* as the basic ontological unit, which means that individuals do not pre-exist their relations with other entities, but instead are constituted through these relations. Barad also introduces the concept of “entanglement” (which she borrows from quantum physics). Entanglement describes a situation in which the qualities of certain entities are not fixed or determined before these entities enter into relations with one another: they materialise only through intra-actions and relationalities. Furthermore, entanglements challenge the linear character of time due to the way in which the future can alter the past (this is also why, thus understood, entanglement is not synonymous with “intertwinement” or “enmeshment”). Barad discusses the double-slit experiment in physics and the follow-up quantum eraser experiment, which demonstrate how the researched object and the agencies of observation are inseparable (Barad 2007).⁶⁵ Barad argues that entanglements – as they are understood in quantum physics – demonstrate that entities do not have pre-determined features or characteristics; instead, these qualities and boundaries between different elements hypostatise only through the entanglement of material-discursive practices; that is, the processes and procedures of meaning- and matter-production. In this context, the past, present, and future are not distinct

⁶⁵ To put it briefly, in both experiments a beam of atoms is sent through two closely-spaced slits and directed onto a screen that records the pattern left by the atoms. This aims to detect whether the entity (i.e. the atom beam) has the quality of a wave or a particle. If the pattern is scattered, the entity in question is deemed to be particles, but if an interference pattern is recorded, then the entity appears to be a wave. If the experimental setup is modified by integrating a which-slit detector, namely, a mechanism that detects which of the two slits each atom goes through, the pattern recorded on the screen is scattered. However, if the detected information concerning the slits is erased (after the atoms have reached the screen), the pattern on the screen becomes a set of interference fringes again (see: Barad 2007).

blocks, but are “iteratively reworked and enfolded through the iterative practices of spacetime-mattering” (ibid., 325).

This resonates with Haraway’s account of ontology as based not on discrete, fixed entities, but instead on the linkages and connections between these elements. As she underlines, “the partners do not pre-exist their constitutive intra-action at every folded layer of time and space” (Haraway 2008, 32). Since the material is intertwined with the discursive, both Haraway and Barad argue for a close relation between ontology and epistemology and their link with ethics (hence, Barad’s notion of “ethico-onto-epistemology”). Haraway also indicates that nature (often associated with matter) is not a pre-existing, innocent (and frequently romanticised) origin, but a powerful material-discursive construction:

nature is not a physical place to which one can go, nor a treasure to fence in or bank, nor an essence to be saved or violated. Nature is not hidden and so does not need to be unveiled. Nature is not a text to be read in the codes of mathematics and biomedicine. It is not the “other” who offers origin, replenishment, and service. Neither mother, nurse, nor slave, nature is not matrix, resource, or tool for the reproduction of man. (Haraway 2003b, 297)

Furthermore, she situates the question of nature in the context of the Eurocentrism and anthropocentrism of Western thought and culture:

I think the answer to this serious political and analytical question lies in two related turns: 1) unblinding ourselves from the sun-worshipping stories about the history of science and technology as paradigms of rationalism; and 2) refiguring the actors in the construction of the ethno-specific categories of nature and culture. The actors are not all “us.” If the world exists for us as “nature,” this designates a kind of relationship, an achievement among many actors, not all of them human, not all of them organic, not all of them technological. (ibid., 298)

According to Haraway, nature and culture are materially and discursively entwined with one another: thus, she speaks of “naturecultures” (Haraway, 2003a). She introduces this concept in her discussion of the

historical relationship between humans and dogs, their companionship, significant otherness, and becoming-with each other.⁶⁶

The emphasis on the interconnection between ontological, epistemological, and ethical perspectives forms part of feminist materialism, which is also referred to as “new materialism”⁶⁷ or “postconstructionism” (Lykke 2010). The focus on the relation between human and nonhuman, combined with the critique of Enlightenment Humanism and the rational human subject, are, on the other hand, frequently described as the posthumanist aspects of contemporary feminist thought. I mention all of the above notions not in order to classify and delimit feminist theorising: that would be a reductionist gesture. Rather, I invoke these terms as loose and provisional descriptions or signposts which might prove to be helpful in mapping out the philosophical terrain from which this project stems, but which do not exhaust or do justice to the diversity of this field.

1.2. Assemblages

Although I share many feminist materialist concerns (the understanding of matter as non-inert, the focus on the nonhuman, and the critique of the rational subject of Enlightenment Humanism, to name a few), following Weinstein (2016), I am wary of the use of the concept of agency, due to its association with intentionality in both philosophy and legal theory.⁶⁸

⁶⁶ When critiquing Deleuze and Guattari’s notion of “becoming,” Donna Haraway offers instead the concept of “becoming-with” based on theorisations proposed by Vinciane Despret and Maria Puig de la Bellacasa (see: Haraway 2008, 321n19). However, taking into account the processual and relational character of Deleuzoguattarian ontology, one might easily argue that their understanding of becoming is always already “with” and that Haraway has simply misinterpreted their concept. For a vibrant critique of Haraway’s analysis of Deleuze and Guattari’s conceptual propositions, see Stivale 2014.

⁶⁷ See e.g.: Alaimo and Hekman 2008; Coole and Frost 2010; Dolphijn and Van der Tuin 2012.

⁶⁸ As Weinstein argues, in philosophy and legal theory the concept of agency contains intentionality as one of its defining features, and thus it is closely linked to the question of liability and conventionally understood responsibility. Agency, as it is redefined in the work of Haraway and Barad, among others, loses this component of intentionality. Weinstein illustrates her argument against extending the notion of agency by giving an example: “this sort of view of agency of actants could easily devolve into fruitless

This is also why this project is focused, not on the agency of material assemblages but, instead, on their potential to engender affects, reconfigure intensities, and change the development of events, without tracing these capacities back to the concept of agency. A number of theorists working with assemblage theory in different contexts (e.g. Braidotti 2005/2006; Callon 2007; and Müller 2015) underscore that the English translation (“assemblage”) of the French concept of *agencement* loses its component of *agence*, that is, agency. It should be indicated, however, that the French noun *agence* is not a full equivalent of the English “agency”. *Agence* refers to “agency” as: an office, a bureau, or a branch of an institution. The meaning of agency which is relevant in this context, that is, a power or will to act, is usually described in French as *pouvoir*. The French verb *agencer* means: to arrange, to put together, to organise, to lay out. Thus, the relation between Deleuze and Guattari’s concept of assemblage and the notion of agency should be seen as more nuanced and treated with caution. In this project, I find it more fruitful to focus on assemblages as multiplicities of different components, the characteristics of which are constituted, shaped, and transformed only through their connections with other elements within and outside of the assemblage; multiplicities that express the capacity to organise themselves, to modulate, to transform, and to dismantle; and, finally, multiplicities that carry the potential to engender affects and enact changes. As Deleuze puts it,

What is an assemblage? It is a multiplicity which is made up of any heterogeneous terms and which establishes liaisons, relations between them, across ages, sexes and reigns – different natures. Thus, the assemblage’s only unity is that of co-functioning: it is a symbiosis, a

debates around, for example, the mantra of the U.S. National Rifle Association: ‘Guns don’t kill people do.’ Neither uranium nor guns are just innocent objects. But their lack of innocence is imbricated in the relationship with the users of them” (2016). Another example in which the focus on the agency of matter might be ineffective is the debates and political negotiations concerned with climate change. Thus, the concept of (nonhuman) agency requires a very precise clarification each time it is used, especially in the context of political debates and in relation to the issue of (legal and political) responsibility.

“sympathy”. It is never filiations that are important, but alliances, alloys; these are not successions, lines of descent, but contagions, epidemics, the wind. ... An animal is defined less by its genus, its species, its organs, and its functions than by the assemblages into which it enters. (Deleuze and Parnet 2002, 69)

In this way, assemblages are not defined by the means of classification and organisation or the lines of descent. Instead, what matters are the connections and interactions between its components. Furthermore, the properties of an assemblage are not reducible to the sum of the properties of its components (or, “the sum of the vital force of each materiality considered alone” (Bennett 2010, 24)). Rather, the properties of assemblages result from “the actual exercise of their capacities” (DeLanda 2006, 11). In assemblages, entities and forces are in a state of becoming (with each other), understood as a creative processuality, which happens in-between and prioritises connections, relations, and linkages over individual components. In this sense, multiplicities precede formed elements (and this is also why forces and entities are neither independent nor distinct from one another). As Deleuze and Guattari state, becoming “produces nothing other than itself” (2004, 262). They also underline that assemblages are both semiotic and material: meaning and matter are not self-contained and autonomous; instead, they are enmeshed together in the assemblages of which they form part.

Manuel DeLanda underscores that the components of an assemblage are characterised by the “relations of exteriority,” which means that “a component part of an assemblage may be detached from it and plugged into a different assemblage in which its interactions are different” (DeLanda 2006, 10). This refers to the material and semiotic components of assemblages alike. Furthermore, assemblages are characterised by *lines of deterritorialisation*; that is, a capacity for undoing present relationalities and for transformation, as a result of which “the assemblage no longer presents an expression distinct from content, only unformed matters, destratified forces, and functions” (Deleuze and Guattari 2004, 556). In other words, assemblages have the capacity for both connecting, gathering, and assembling, and for disassembling,

disintegrating, disconnecting, and reconfiguring current relations. Thus, they carry the potential for excess expressed through deterritorialisation. This potential for surplus forms part of life's uncontainability; uncontainable life expresses itself by forming assemblages of different entities and processes: assemblages that are not static, fixed, or isolated from one another.

1.3. Affects

Assemblages come together, reassemble, and disperse through the movement of affect: a non-subjective intensity. As Deleuze writes in his commentary on Spinoza's *Ethics*, affects are "passages, becomings, rises and falls, continuous variations of power [*puissance*] that pass from one state to another ... They are signs of increase and decrease, signs that are *vectorial* ... and no longer scalar like the affections, sensations or perceptions" (Deleuze 1997, 139; italics in the original). In other words, whereas an affection is understood by Deleuze as a specific influence, impact, and "instantaneous effect of a body upon my body" (ibid.) at a certain moment in time, an affect refers to a non-personal intensity, a form of transformation and modulation that is not ascribed to or consciously experienced by any particular subject. Furthermore, affects have a certain direction and magnitude: "increase or decrease, growth or decline," but they may also be "ambiguous or fluctuating," that is, simultaneously encompassing growth and decline (ibid., 140).

I would like to emphasise that this understanding of affects as "variations of power" which refer to "states of bodies (affections)" (ibid., 141) differs from the theorisations of affect dominant within the "affective turn." Scholars whose work is considered representative of this turn, and who often write in the tradition of phenomenology, psychology, and neuroscience, interpret affect as an emotion, feeling, or corporeal response as it is experienced by the subject.⁶⁹ Thus understood, affect is personal, subjective, equated with emotion, and, hence, humanistic. As a

⁶⁹ See e.g.: Ahmed 2004; Sedgwick 2003; Tomkins 2008; Berlant 2011; Damasio 1999; Panskepp 2000; Davidson 2003.

result, when defined in this way, affect seems to lose its potential to go beyond the conscious experience of the subject. As Brian Massumi underscores, although “Affect is most often used loosely as a synonym for emotion,” it should be kept in mind that “emotion and affect – if affect is intensity – follow different logics and pertain to different orders” (2002, 27).⁷⁰ This is also why, in order to investigate how the uncontainability of life is exposed through the non/living matter of bioartworks, I turn to the Deleuzian-Spinozian conceptualisation of affects as “*nonhuman becomings*” (Deleuze and Guattari 1994, 169; italics in the original). If affects are “becomings that spill over beyond whoever lives through them” (Deleuze 1995, 137) and forces that exceed the contours of the body and occur when bodies (organic and inorganic, physical and conceptual) come into contact with one another, then they may shed light on the potential of the surplus carried by uncontainable life. As Braidotti notes, in the context of the Deleuzian-Spinozian theory of affect, “A body ... indicates merely a dosage and an assemblage of forces, a portion of spatio-temporally framed affects: it is a multiple phenomenon” (Braidotti 2002, 104). Such a multiplicity of forces comes to the fore in bioartworks: these forces rearrange non/living elements into assemblages, create their contours, and simultaneously exceed the frames of bodies and artworks. The growth, accumulation, and increase in power of certain bodies is enmeshed with the decay and destruction of others. These forces and processes refuse to remain enclosed in any material or theoretical frames, but instead, transform assemblages and exceed the set boundaries. The concept of uncontainable life that I propose attends to this enmeshment, multiplicitous processuality, “positive structure of difference” (Braidotti 2006, 145), transformation, and finally, the potential for excess that expresses itself in the processes of becoming.

⁷⁰ Massumi notes that there is a lack of cultural-theoretical vocabulary appropriate to talk about affect. Most of the time, we are left with theories of signification, and as a result “it is all too easy for received psychological categories to slip back in, undoing the considerable deconstructive work that has been effectively carried out by poststructuralism” (2002, 27).

2. Life: On Biopolitics and Neo-vitalism

In twentieth and twenty-first century philosophy, the question of life has been framed in multiple ways, notably through biopolitics and neovitalism. Despite the specificity of recent discussions around both these strands, genealogies of some of their elements may be traced back to the roots of the Western philosophical tradition. Whereas the question of biopolitics deals with an ethico-political dimension of the concept of life and, therefore, concerns ontological issues only insofar as they directly affect issues of power and politics, neovitalism prioritises ontological questions. Both of these approaches to thinking about the living and the non-living have had a major impact, not only on the landscape of contemporary feminist theorisations of life, but also on bioart.

2.1. Biopolitics

Within contemporary philosophy, one may distinguish at least two disparate tendencies in relation to how the concept of biopolitics shapes ongoing debates. Firstly, there is the theorisation of biopolitics in the light of Martin Heidegger's metaphysics of finitude and the related issues of Nazism and twentieth and twenty-first century genocides. It perceives biopolitics as a politics over life that sets a threshold below which life can be annihilated with impunity and in which life is always located on the horizon of death. For this reason, Giorgio Agamben (2008) suggests that biopolitics is always already a *thanatopolitics*. Focusing on modern colonialism and the contemporary entwinement of life and power, Achille Mbembe argues that the concepts of *necropolitics* and *necropower* are more adequate for understanding biopolitical processes as these notions shed light on "the various ways in which, in our contemporary world, weapons are deployed in the interest of maximum destruction of persons and the creation of *death-worlds*, new and unique forms of social existence in which vast populations are subjected to conditions of life conferring upon them the status of *living dead*" (Mbembe 2003, 40; italics in the original). Along with Agamben and Mbembe, this current of thought may also be

found (although to a much lesser extent) in the writings of Roberto Esposito, who prefers to position himself between the two strands – the negative and the affirmative – of biopolitics (Esposito 2008).

Secondly, there are theorists who read Foucault's analyses through, for example, Spinoza's theories of ethics and affect, Bergson's vision of time and matter, Deleuze and Guattari's understanding of desire and power, and sexual difference theory. Such a reframing is intended not only to concentrate on the idea of biopolitics as an ethico-political stance, but also to extract its emancipatory potential. Esposito calls this line of theorising an "affirmative" biopolitics and associates it with such thinkers as Antonio Negri and Michael Hardt (2006), Maurizio Lazzarato (2006) and Paolo Virno (2004). Within the frames of affirmative biopolitics, life is not perceived as subdued and enclosed by the horizon of death. Hardt and Negri employ the concept of "positive biopolitics" or "politics of life," defined as a politics that "constantly creates the new social being" (Hardt and Negri 2004, 348). In this context, life is linked to the issue of labour: immaterial, affective, and reproductive labour is what enables the human population to continue to live. Esposito offers his own theorisation of an affirmative biopolitics that comprises two philosophical gestures, which, according to him, are also the two necessary conditions for thinking affirmative biopolitics. The first consists of the reading of the concepts of "immunity" and "community" together, which leads to the deconstruction and overcoming of the paradigm of immunisation. The second gesture involves the deconstruction of the apparatus of Nazi biopolitics, while relying on the fact that "harming one part of life or one life harms all lives" (Esposito 2008, xl).

Despite his efforts to both theorise biopolitics differently and invoke thinkers whose ideas are not framed by the discourse of death and genocide, Esposito's list of philosophers working within the strand of affirmative biopolitics appears to be incomplete. He seems to ignore those representatives of feminist tradition who theorise through biopolitics and offer new perspectives. One of the most prominent feminist philosophers, whose work has contributed to contemporary biopolitical debates, is Braidotti. She offers an interpretation of

biopolitics⁷¹ based on the idea of life as *zoe*, a generative and persistent force of material transformations, in order to account for the organic and inorganic intensities involved in the entwinement of life and power in the context of advanced capitalism. Furthermore, if one examines the Italian Marxist tradition of thinking about the work of care and the reproduction of society as key forms of immaterial labour that are inextricably entwined with the question of politics (as explored by Negri, among others), it is impossible to overlook the contribution of *Lotta Femminista* [Feminist Struggle]. *Lotta Femminista* is an Italian Marxist feminist movement founded in the 1970s, whose representatives focused not only on the ways in which female subjectivity is produced and inscribed in society, but also, and most importantly, on the issue of reproduction that “emerges as the hidden object whose control influences and causes contradictory movements, unexpected concessions as much as drastic discriminations” (Righi 2011, 47).⁷² In this way, as Andrea Righi suggests, they opened up the question of the biopolitical in a new way, pointing to how “the regulations of sexuality/reproduction are measures governing life qua the general capacity to work (labor-power)” (ibid., 47).⁷³

The way in which each understanding of biopolitics is theorised relies on a specific notion of life, and the one that forms the basis for contemporary biopolitical propositions is mainly of a human kind. When Agamben (2004) talks about the anthropological machine and the relation between the animal and the human, it is only the animal *in* and *of* the

⁷¹ More specifically, Braidotti talks about *zoe*-politics (2013, 118) or “the politics of life itself” (Rose 2007), where “life itself” is no longer of the human kind.

⁷² Among the thinkers who formed part of *Lotta Femminista* and whose work takes inspiration from it, one should remember the names of feminist activists and theorists like Mariarosa Dalla Costa and Leopoldina Fortunati.

⁷³ Despite his attempts to think the link between life and the political – while avoiding the frames of Enlightenment Humanism – and his emphasis on “all lives,” Esposito also elides authors who focus on the ways in which capital is entwined in the biotechnological management of plant and animal lives (for instance, of crops and livestock). Examples may be found in, for instance, Vandana Shiva’s work on biopiracy (Shiva 1998; Shiva and Moser 1995) and Donna Haraway’s writings on the patenting of living organisms and biopolitics in a biotechnological age (Haraway 1991; 1997).

human that is at stake. As I already mentioned, Esposito (2008) goes further and draws on the “unity of life,” which encompasses every form of life; yet, once again, the unity of all living seems to be of significance for his theory only to the extent that it relates to the human. Although he does not clearly state that he is interested exclusively in human life when he underscores this unity, I would argue that his starting point, namely, the critique of Nazi thanatopolitics (in which human life is subordinated to the law, which is simultaneously biologised: “Only a life that is already ‘decided’ according to a determinate juridical order can constitute the natural criteria in the application of the law” (Esposito 2008, 184)), determines his primary focus. He also describes Deleuze’s singularity of a life as “a person that doesn’t coincide with any of those [forms] in which we are accustomed to decline the subject (I, you, he)” (ibid., 193). Thus, he equates “a life” with “a person.” In both his own biopolitical theory and in the context of Deleuzian writings on life as immanence, Esposito redefines the idea of “a norm of life” as that which is not transcendental to life but, instead, that which should be seen as “the immanent impulse of life” (2008, 194). The norm then should be thought *in* life. In this sense, Esposito simultaneously follows both Spinoza (where the norm is perceived as the “immanent rule that life gives itself” in its variety of forms (ibid., 186)) and Canguilhem (where the norm is defined as a pure mode of being). As I noted in the Introduction, for Canguilhem, disease also constitutes a norm; however, a norm expressing a specific situation of life. A norm understood in this way discloses the physiological potentiality of the organism in a negative manner.⁷⁴

Braidotti, on the other hand, reads the question of life through Deleuze and Guattari’s concept of radical immanence, Bergson’s concepts of duration and creative evolution, and Spinoza’s theory of affects. In this way, she defines life as *zoe*, a relentless, generative, and ruthless force; a force that equates the processes of production with those of decay and destruction (of individual bodies): “the endless vitality of life as continuous becoming” (Braidotti 2006, 41). In this sense, life does

⁷⁴ See also: Esposito 2008, 185–189.

not pertain to a certain subject (whether of a human or a nonhuman kind), but is rather something that the subject inhabits (ibid.). What she further proposes is a *bios/zoe*-politics, a politics of life itself, where *bios* (the life of an individual) is not extracted or separated from a vital materiality of force, *zoe*. Although Braidotti emphasises the processuality and non-individualistic character of life, she preserves the distinction between *zoe* as nonhuman vitality (“the poor half”) and *bios*: “half-political and discursive” and “the self-reflexive control over life ... reserved for the humans” (ibid., 37). In other words, she makes an exception: human life, as it is narrated, controlled, and moulded by scientific, economic, and political discourses, is separated from the undifferentiated nonhuman “mass” of *zoe*. Taking into account, for example, the colonisation of nonhuman life by technoscience, economy, and politics (as Braidotti sees it), drawing a division between the life of a human individual and the nonhuman vitality of life does not seem to be an effective strategy for repudiating the exceptional position of the human and human life, because such a division relies on seeing one part of human life as an exception with regard to other forms of life.

Braidotti emphasises the role and importance of transversal interconnections and the sustainability of any embodied and fleshly embedded entity. Organisms are not autonomous individuals, they are co-dependent. The microbiome, which I mentioned in the Introduction, is the prime example of such interdependency. Organisms become with one another: they transform, change, and perform their living functions through their connections and interactions with other organic and inorganic entities. The processes of development, growth, and decay result from the flows of organic and inorganic matter and energy among different bodies and their environments. The sustainability of a body refers to this body’s attunement: its capacity to endure through the series of interconnections and encounters, by being affected by and affecting other entities, expressing its potentials, and opening up towards the future. She also redefines *bios/zoe*-politics as a form of ethico-politics of bio-centred egalitarianism, a project which sees human and nonhuman agents in their multiple and transversal interrelations, alliances, and

transformations (Braidotti 2006, 110). This also means that, for Braidotti, the question of biopolitics cannot be concerned exclusively with the human and human life (with both its human and nonhuman aspects). Life does not belong to an individual; rather, it is a series of continuous becomings and material processes, an ongoing force that one may only “inhabit ... as a time-share location” (ibid., 211). “One” does not have to equate to “human.” What is crucial here is Braidotti’s emphasis on the significance of eradicating anthropocentrism while theorising ontology, epistemology, and ethico-politics. That is also why her preservation of life as *bios* seems rather striking and works against the grain of her theorisation of life as *zoe*.

Another important contribution to the debate on biopolitics and its link to the concept of life in a human and nonhuman sense is Cary Wolfe’s book *Before the Law* (2013). As well as drawing on Foucault, Agamben, and Esposito, Wolfe invokes Jacques Derrida’s arguments on *carnophallogocentrism* and hospitality. One of the tasks that Derrida posits in his work is the deconstruction of phallogocentrism,⁷⁵ understood as the underpinning of Western philosophy and culture, which privileges the masculine (phallogocentrism) and speech (logocentrism) in traditional discourses and the construction of meaning. The concept of

⁷⁵ This concept reveals the ways in which the production of meaning and discourse are traditionally gendered (masculinised) and structured upon the exclusion and erasure of the feminine and women. Derrida depicts these structures and the role of deconstruction in this context in the following way: “I mostly speak ... of sexual *differences*, rather than of just one difference – dual and oppositional – which, along with phallogocentrism, with what I also dub carno-phallogocentrism, is in fact a structural feature of philosophical discourse that has been dominant in the tradition. Deconstruction goes by that route in the very first place. Everything comes back to it. Before any feminist politicization (and even though I have often associated myself with that, on certain conditions), it is important to recognize this powerful phallogocentric basis that conditions more or less the whole of our cultural inheritance. As to the specifically philosophical tradition of this phallogocentric inheritance, it is represented – in a different but equal way – in Plato as much as in Freud or Lacan, in Kant as much as in Hegel, Heidegger, or Levinas. At any rate I have applied myself to demonstrating that” (Derrida and Spire 2005, 154). For Derrida, deconstructing phallogocentrism means deconstructing history and opening “a space favorable to the *coming of the other*. By appealing to *the voice of the other*, he [Derrida] thus engages the *perchance* of a reorientation of history, discourse, and the tradition.” (Dely 2007, 14)

carnophallogocentrism expands this idea: it demonstrates that these structures in general, and the subject in particular, rely not only on the exclusion of the feminine, but also upon both symbolic and real sacrifice:

Authority and autonomy ... are, through this schema, attributed to the man (*homo* and *vir*) rather than to the woman, and to the woman rather than to the animal ... The virile strength of the adult male, the father, husband, or brother ... belongs to the schema that dominates the concept of the subject. The subject does not want to just master and possess nature actively. In our cultures, he accepts sacrifice and eats flesh. (Derrida 1995, 280–281)

This implies, as Derrida argues, that there is a space in this structure that allows for “a noncriminal putting to death. Such are the executions of ingestion, incorporation, or introjection of the corpse. An operation as real as it is symbolic when the corpse is ‘animal’ ... a symbolic operation when the corpse is ‘human’” (ibid., 278). He also points out that one of the key principles of the Judeo-Christian tradition, that is, the commandment: “Thou shalt not kill” has never been recognised as meaning: “Thou shalt not put to death the living in general” (ibid., 279). It is this inability to “sacrifice sacrifice” that forms one of the constitutive factors of Western philosophy and culture. If one starts to examine the border between that which is and is not (in both a symbolic and a real sense) sacrificed, put to death, interiorised or assimilated, one also needs to pose the question of what is “the best, most respectful, most grateful, and also most giving way of relating to the other and of relating the other to the self” (ibid., 281–282). This ethical concern is directly linked to Derrida’s notion of hospitality and its aporetic character: unconditional hospitality can be effective only insofar as it is framed by specific conditions. Yet, since it is delimited by “rights and duties that are always conditioned and conditional” (Dufourmantelle and Derrida 2010, 77), it cannot be unconditional. Derrida explains this aporia by referring to logic and the asymmetrical relation between the (general, universal) law and the (multiple, particular) laws: “*The* law, in its universal singularity, [is opposed] to a plurality that is not only dispersal (laws in the plural), but a structured multiplicity, determined by a process of division and

differentiation: by a number of laws that distribute their history and their anthropological geography differently” (ibid., 79; italics in the original). The law requires the multiple and specific laws in order to operate and be effective:

It wouldn’t be effectively unconditional, the law, if it didn’t *have to become* effective, concrete, determined, if that were not its being as having-to-be. ... *the* law thus needs the laws, which, however, deny it, or at any rate threaten it, sometimes corrupt or pervert it. ... And vice versa, conditional laws would cease to be laws of hospitality if they were not guided, given inspiration, given aspiration, required, even, by the law of unconditional hospitality. (ibid., 79; italics in the original)

The conditions of possibility of hospitality are simultaneously its conditions of impossibility. In this way, hospitality towards the other can be understood, not as a universal rule applied equally (at the same time, in the same space, measure, and manner) to everyone, but as something multiple, particular, differential, and expressed on a case-by-case basis. Simultaneously, unconditional hospitality should be seen as an (im)possible ideal and horizon.

Commenting on Derrida’s concepts of hospitality and carnophallogocentrism, Wolfe points to the intrinsic linkages among the exploitation of nonhuman animal bodies (especially in the form of the production and consumption of meat); the idea of the autonomous, liberal, self-contained subject; capitalist globalisation;⁷⁶ and a “massive ‘not wanting to know’” (Wolfe 2013, 101). This desire to not know/see/hear, to ignore, understood by Derrida as a “‘more or less’ conscious and deliberate terrorist strategy” (Wolfe 2013, 100), is not only related to violence against, and the extensive killing of, nonhuman animals, but also to the precarious state of the entire planet (in the sense of environmental sustainability). Furthermore, through hospitality, which in order to “be real, must be something ‘determinate’ and ‘conditioned’” (ibid., 103), Wolfe suggests that “affirmative biopolitics” cannot simply equally affirm all (undifferentiated) life. He makes his point clear by

⁷⁶ See also: Derrida 2005.

invoking a characteristic of the Actor Network Theory (ANT) perspective, according to which different actants (or “things”) are horizontally interconnected. Although such an idea of “flat ontology” is a compelling ontological approach and a starting point for biopolitical reflection, it cannot be taken as an ultimate model for ethics, morality, or politics, Wolfe argues. Different life forms, and thus different others, require heterogeneous modes of response and responsibility.⁷⁷ As he underlines, “there is no ‘god’s eye view’” with regard to which lives are to be protected; instead, “there are *only* ‘limited points of view’” (ibid., 86; italics in the original). Differences among different forms of life and exclusions are unavoidable. Wolfe emphasises the usefulness of the revised biopolitical framework as a tool that allows one to identify the extent to which violence and power are exercised over nonhuman animal (as well as plant and earthly) bodies and life. In other words, the biopolitical framework based on Foucault’s analyses of the mechanisms of power and knowledge production that render life a “political and economic resource” (Wolfe 2013, 102), Esposito’s elaboration of the role of immunitary mechanisms that operate on all life forms, and, finally, Derrida’s concept of carnophallogocentrism and his insistence on hospitality towards the other, allows Wolfe to critically examine the place of human and nonhuman animal life in the context of advanced capitalism.⁷⁸ An immunitary protection (e.g. against exploitation) based on the capacity to “respond” is linked to the issue of responsibility and accountability, as well as to the awareness that, regardless of which choices we make, which forms of life we decide to protect, “*in the future*,

⁷⁷ In order to illustrate this, Wolfe gives an example of a primate used as a test animal in a scientific laboratory. He underscores the qualitative difference between the primate, the flea on her skin, and the cage she lives in (ibid., 83). This difference implies diverse ethical relations towards each of these entities.

⁷⁸ It is through this lens that Wolfe analyses the simultaneity of such procedures as granting basic human rights to certain species of nonhuman animals and the unprecedented extermination of nonhuman animals in the farming industry, which may also be seen as a prime example of the immunitary paradigm at work. The phenomenon of massive, industrialised slaughter of nonhuman animals in factory farming, paralleled by the sixth largest extinction in the history of the Earth, is what Wolfe calls, after Jonathan Safran Foer, “a ‘war’ on our fellow creatures” (Wolfe 2013, 105).

we *will have been wrong*” (ibid., 103; italics in the original). Absolute responsibility, like unlimited hospitality, is possible only insofar as it is selective and conditional (and, hence, neither absolute nor unlimited), “since all cannot be welcomed, nor all at once” (ibid., 103). There is no fixed frame of reference: each ethical decision and each act of hospitality can only be made on a case-by-case basis.

The multiple versions of biopolitical theory that I sketch above strive to demonstrate the complexity of arguments about what life means in an ethico-political context and how it is intertwined with power in the late twentieth and early twenty-first centuries. It is no longer exclusively the life of a human being, of human populations, or of nonhuman animals that is at stake. Instead, the “bits of life,” or life itself, that is, the processes of change and transformation of organic matter (along with the life of individual organisms and populations), become an object of technoscientific manipulations, political investments, and ethical concerns. Biopolitical analyses allow one to understand how power and knowledge are invested in heterogeneous ways in the moulding, control, eradication, and preservation of the living. They also demonstrate – as Wolfe’s argument suggests – that, despite the entwinement of ontology and ethics, the latter does not necessarily mirror the former.⁷⁹ As Weinstein reminds us, referring to David Hume’s meta-ethical naturalistic fallacy, “one cannot derive an *ought* from an *is*, or piecemeal prescribe a normative obligation from a single ontological fact” (Weinstein 2016; italics in the original). This does not mean, however, that revising ontological frames – as this dissertation strives to do – has no influence on one’s ethical and political perspectives. On the contrary, rethinking one’s entire ontological worldview, as Weinstein argues, can rule out certain ethical and political possibilities that are dependent on ontological claims no longer held to be valid (i.e. having a negative causal effect), thereby opening up space for

⁷⁹ Wolfe’s critique of a flat ethics that does not take into account differences between various entities (and is often associated with ANT) may be compared to Weinstein’s critique of the ethical approaches characteristic of OOO, despite the fact that her own proposition of an “ethics of in/difference” can be inscribed in a different tradition than Wolfe’s (Weinstein 2016).

ethico-political reconsideration. This is also why the various biopolitical perspectives outlined above are linked to the variety of ontological premises upon which they rely. Braidotti's and Wolfe's analyses underscore the processual and metamorphic character of biological matter that occupies centre stage in contemporary technoscientific practices (like stem-cell research, tissue engineering, and IVF) and the accompanying legal regulations, (bio)political debates, economic calculations (including the patenting of genetically modified organisms), and cultural narratives. At the same time, the biopolitics of "making live" and "letting die" (where often the difference of race or species legitimises the killing)⁸⁰ of individual human and nonhuman animal bodies does not disappear or decelerate: increasing global meat production and consumption (which equates to the unprecedented extermination of nonhuman animals on an industrial scale and the destruction of the environment), Europe's concerns with the decreasing birth rate, women's reproductive rights, and, finally, the refugee crisis related to the current conflict in the Middle East are only a few of the completely different biopolitical matters that we see every day in the media. Micro- and macro-scale biopolitics permeates the tissue of the contemporary world and the analysis of these mechanisms lays bare the role of power, knowledge, and economy in regulating, manipulating, and valorising life as a process, a substance, and a body.

In a similar manner, biopolitics exposes the manifold ways in which life as a differentiating and processual material force is governed and moulded in the field of bioart, and the ways in which it sometimes exceeds the frames imposed through management. Life in bioart is shaped not only by the artistic practices as such, but also through legal regulations, ethical codes and discussions, political debates, and cultural narratives that are invested in the management of both biological matter

⁸⁰ Wolfe reminds us of Foucault's words: "Racism ... creates 'caesuras within the biological continuum addressed by biopower'; it is 'a way of fragmenting the field of the biological that power controls' so that some populations may be killed or allowed to die – what Foucault bluntly calls 'indirect murder.' 'In a normalizing society,' he writes, 'race or racism is the precondition that makes killing acceptable'" (Foucault 2003, 255–256 cited in Wolfe 2013, 43).

as such and human and nonhuman bodies in an individual and collective sense.⁸¹

2.2. Neovitalism

The issue of the biological materiality of life is also significant for another way of thinking life in contemporary theory: neovitalism. In a general sense, vitalism is a philosophical tradition concerned with the question of the living and the principles of life. This may be traced back to the time of Plato and his predecessors.⁸² Yet, the present-day “vitalist turn,” substantially influenced by such global problems as the extermination of organic life or species extinction, can be directly linked to the work of Deleuze (and Deleuze and Guattari) and the way in which he draws on the so-called minor tradition of philosophy. Deleuze describes a major part of this tradition as philosophical “expressionism.” This characterises the philosophies of both Spinoza and Leibniz, who (each in his own way) underline one univocal substance (or, one life), which expresses itself in both the body and the mind, thus doing away with Cartesian dualism and mechanism (Colebrook 2014b, 103). As Deleuze writes, “Expression in general involves and implicates what it expresses, while also explicating and evolving it” (1992, 16). In this way, discrete entities are expressions of one univocal life “which becomes what it is only in its production of diverse and emanating bodies” (Colebrook 2014b, 104). According to Deleuze, this tendency is intensified in the work of Nietzsche, where life appears as “a plane of forces effecting itself through styles and dramas” (Colebrook 2014b, 104). This is also why Colebrook argues that, from

⁸¹ For example, TC&A’s project *Disembodied Cuisine*, which involves the bioengineering of miniature steaks from animal cells, brings to light and is simultaneously affected by political and technoscientific debates concerning the industrial manufacturing of laboratory-grown meat, the environmental impact of both traditional and future methods of meat production, and the related ethical aspects.

⁸² As I indicated in the Introduction, Thacker notes that a properly articulated question of life and its ontology is to be found in Aristotle’s *De Anima*. Aristotle’s division between the concepts of “life” and “the living” becomes crucial for the active-vitalist, post-Aristotelian ontologies of life, which have had a major impact on the Western philosophical tradition’s treatment of the problem of life (Thacker 2010).

Deleuze's own perspective, expressive life should be understood, not in terms of a common, grounding substrate as such, but rather in terms of forces of differentiation.

In *Deleuze and the Meaning of Life* (2010), Colebrook maps out neovitalist thought and exposes two ways of theorising vitalism: active and passive. This distinction is rooted in Deleuze and Guattari's understanding of vitalism:

Vitalism has always had two possible interpretations: that of an idea that acts, but is not – that acts therefore only from the point of view of an external cerebral knowledge (from Kant to Claude Bernard) or that of a force that is but does not act – that is therefore a pure internal awareness (from Leibniz to Ruyer). If the second interpretation seems to us to be imperative it is because the contraction that preserves is always in a state of detachment in relation to action or even to movement and appears as a pure contemplation without knowledge. (Deleuze and Guattari 1994, 213 cited in Colebrook 2010, 5)

Active vitalism, based on “an idea that acts, but is not,” understands life as a consequence of an external (transcendent) force or spirit that pervades inert and (pre-)given matter. Such a vital principle, as Colebrook stresses, could be conceived of as “an irreducible spirituality that would be required to explain the complexity of the world as it is” (Colebrook 2010, 4). An active principle permeates and shapes matter, while enabling both boundary formation and the self-maintenance and self-preservation of organisms and other entities. Thus understood, vitalism tries to trace back all events or (technical) systems to their “true” origin, or to a relevant, meaningful source (ibid., 23). It accounts for that which is active, which orders, synthesises, and renders meaningful: the forces, interactions, and relations in which an organism is immersed “ought to be referred back to the living being for their *raison d'être* and be evaluated according to the degree to which they further or alienate the organism's individual sense of life” (ibid., 115). This is also why Kant and his idea of the subject as that which has a capacity to synthesise, organise, and create the world as it is for “us” is, for Deleuze and Guattari, one of the key examples of this way of theorising. The question of

vitalism, Colebrook argues, can be understood not only as an account of life as such, but also as an approach to philosophy and thought (this is also her primary concern). In this way, active vitalism equates with “a tracing back of any system, position, dogma or truth claim to the conditions of its genesis, never accepting a truth without also grasping its coming into being” (ibid., 7).⁸³ This is directly linked, she continues, to the way in which active vitalist thought treats that which resists its logic, that is, by “identifying and delimiting the reason of its seeming antagonist” (ibid., 7).

Passive vitalism, on the other hand, does not draw a distinction between a vital force and passive matter, since matter is always already a machinic and creative force. It does not search for a transcendent origin of meaning. In fact, even looking for a source that enables matter to be alive may be read as anthropocentric – only that which from our (human) perspective seems to be enlivened is taken as such. Passive vitalism attends to the differential relation of forces which may actualise in the form of bounded organisms, their living norms and meanings, but which are never exhausted by these elements (ibid., 115). Forces allow for the emergence of bodies, but “if extended, would destroy the bordered organism” (ibid., 39). It is this excessive character of forces that is revealed through the analysed bioartworks: the biological matter of multiplying cells and growing tissues does not remain contained within the organised form of an (artistic) object, an organism, or a balanced whole. Instead, the processes of becoming of biological matter clash with and transform one another: for instance, the tissue outgrows the available space and/or nutrient supply, which leads to the destruction of both the tissue fragments and the form initially “planned” by the artists. Passive vitalism theorises the material power of differentiation that exceeds the boundaries of organs and organisms, and which I call uncontainable life.

⁸³ Colebrook emphasises that active vitalism sees subjective and meaning-productive life as entrapped in “ready-made systems, [and therefore] the task is to regain the sense of the founding intuition, of humanity as a dynamic, self-productive and engaged organism oriented towards a world” (Colebrook 2010, 23).

In *A Thousand Plateaus* (2004), Deleuze and Guattari refer to this aspect of the forces of differentiation when they discuss the ways to become a Body without Organs (BwO).⁸⁴ The concept of the BwO describes a structure or entity (for instance, an actual body, a subjectivity, or a body of knowledge) that evades or undoes its own rigidity, compartmentalisation, classification, and organisation. It is open to experimentation, to flows of matter and energy, and transformation. The BwO, according to Deleuze and Guattari, can be understood as a virtual plane of differential forces that actualise in the “connection of desires, conjunction of flows, continuum of intensities” (Deleuze and Guattari 2004, 179). In the case of actual bodies, the BwO should be seen as a horizon and not a goal: doing away with all forms of organisation (or, undergoing complete “destratification,” as they call it) would lead to the destruction of the body:

The BwO is always swinging between the surfaces that stratify it and the plane that sets it free. If you free it with too violent an action, if you blow apart the strata without taking precautions, then instead of drawing the plane you will be killed, plunged into a black hole, or even dragged toward catastrophe. (ibid., 178)

The concept of the BwO draws attention to the heterogeneity of the forces of differentiation, which enable both the concentration and formation of entities and their boundaries, and their disassembling and disruption.

Thus, passive vitalism accounts not only for the processes of synthesis, growth, and meaning, but also for destruction, division, and inertia. They are all expressions of life. When considered as an approach to thinking, passive vitalism appears to be “an imperative to account for the dynamic emergence of forms, ideas, sense and structures, while the acknowledgement of passivity requires an attention to that which cannot be generated from within thought itself” (Colebrook 2010, 7). In this way,

⁸⁴ The concept of the BwO has its origins in the work of dramatist, poet, actor, and theorist, Antonin Artaud. It is first mentioned by Deleuze in *The Logic of Sense* ([1969] 1990) in his discussion of Artaud’s methodology. Subsequently, the BwO appears in Deleuze and Guattari’s *Anti-Oedipus* ([1972] 1983) and *A Thousand Plateaus* ([1980] 2004).

passive vitalism problematises not only the traditional meaning of life, but also life's relation to thought and what it is to think and to create. Furthermore, it enables us to look at how it is possible for life as a potential to allow for the emergence of the forms of life that turn upon themselves. Thus, it also elucidates stupidity and malevolence, which come from outside of thought, and thought that is inherently anti-vitalist, like Cartesian mechanism. These tendencies can be seen, not as the negation or "fracturing of life," as Colebrook argues, but instead "*as life itself*," that is, "life as fracture" (ibid., 183; italics in the original). In other words, in the light of passive vitalism, that which seems to hinder life, whether it is malice, death, or extinction, is not a disturbance of the life potential, but instead forms part of this potential, like the decay and infection of the tissues in the TC&A's bioartworks. This is also why Colebrook calls Deleuze's passive vitalism a "hyper-vitalism": a thought that accounts for discrepancies, contradictions, and incoherencies within itself.

What matters in the context of the analysis of bioart is that passive vitalism provides a particular understanding of the connection between life and death – between organic, generative processes of creation and organisation on the one hand, and the propensity towards disorganisation or dis-embodiment, on the other (ibid., 12). As Colebrook argues – in line with Braidotti's reading of *zoe* and death – processes of annihilation, or rather, their potential, are always already encompassed by the generative forces of life (ibid., 5). Passive vitalism sees the concept of life as radically immanent and monist: it is matter and thought intertwined with one another and acknowledged as a multiplicity of forces which, through their intra-active encounters with their milieu, produce multiplex relationalities (ibid., 16). Moreover, Colebrook suggests that one may see the idea of vitalism in a double way: extensively – as a set of theoretical tools to "think the genesis of our actuality" – and intensively, life perceived and analysed "on the basis of the living and the lived" (ibid., 137). In a sense, one may say that this provisional division could also be

seen as a boundary between the two kinds of questions one could ask about life: onto-epistemological and ethico-political.⁸⁵

In her analysis of passive vitalism, Colebrook cites Raymond Ruyer and his concept of “absolute survey”; Deleuze and Guattari enlist Ruyer as one of the key representatives of this tradition. As she emphasises, for Ruyer,

an individual being takes on the form that it does only because in addition to its own time and point of view there is both a position of “absolute survey” – or the point of view of life as such, of which the organism’s own sensed viewpoint is a fragment – and “transcendental forms” that orient becoming. (Colebrook 2010, 34)

Ruyer introduced this concept in his biological and psychological writings in order to discuss perception, sensation, and consciousness. As Mary Beth Mader (2011, 24) underlines, Ruyer identifies “absolute surface” (or “survey”) with self-survey: “An absolute surface is a surface that surveys itself without being of a different dimension than that which it surveys.” Ruyer (1952) explains this concept by looking at examples of

⁸⁵ Following the split between extensive and intensive approaches to vitalism, Colebrook also distinguishes two forms of engagement with the concept of life among Deleuze and Guattari scholars. The first way of dealing with the question of life may be characterised as a “materialist ontology of bodies” (ibid., 6). Apart from the work of John Protevi and Manuel DeLanda, who are named as representatives of this first strand, I would add Braidotti, whose work carries the legacy of both sexual difference theory and Deleuzoguattarian philosophy, and is primarily concerned with the problem of the materiality of the body and of life as a generative force. In a way, this materialist ontology of bodies may also be seen, I suggest, as ethico-political and related to the previously introduced question of biopolitics. The second form of analysis is predominantly concerned with the question of the virtual (represented by, e.g., Dorothea Olkowski, James Williams, and Daniel Smith), and is focused on ontology or onto-epistemology. Categorising the different analyses of life as being focused on either ontology-epistemology or ethico-politics seems artificial, if not contradictory, from the perspective of feminist-materialist claims about the relation between ontology, epistemology, and ethico-politics (they are perceived as intertwined with each other). Yet, I employ this distinction here as a provisional tool. As such, it may be helpful to identify the minor differences and nuance our understanding of the concepts at stake. In this way, we can focus on how these concepts are employed by both philosophers and bioartists, and, most importantly, how the concepts operate by way of interference in their respective practices.

both human and animal (*Protozoa*) perception and sensation. He argues that the example of a man sitting at a table and writing illustrates that “perception as a physico-physiological event” is different from “visual sensation,” which can be identified with self-survey (Mader 2011, 24). As he writes, “It [absolute surface] does not obey the laws of physical geometry. It is a surface seized in all its details, without a third dimension. It is an ‘absolute surface’ that is not relative to any point of view external to itself, that knows itself without observing itself” (Ruyer 1952, 98 cited in Mader 2011, 25). In this way, there is no distance between the survey and the surveyed surface. Furthermore, Ruyer admits that the concept of absolute survey is of key importance not only for the question of consciousness, but also for the problem of life (Ruyer 1952, 100). Thus, what his perspective suggests is that there is no observer or agent outside of life that could initiate life’s transformation or movement: life itself is a virtual (and, thus, real but not actualised) potential characterised by the capacity, not only for self-formation, self-enjoyment, and sense, but also for “non-relation, inertia and death” (Colebrook 2010, 175). In this way, life is radically immanent (that is, not immanent to anything else but itself) and, thus, uncontainable. As Colebrook indicates, “for Ruyer any statement or claim regarding the subject’s relation to the world – whether that be a claim from freedom or determinism – demonstrates that there is a sense of the world. This cannot be attributed *to* a subject, for this would involve an infinite regress” (ibid., 173), or, in other words, would require an external perspective.

Ruyer’s notion of sense and Spinoza and Bergson’s concept of affect are not personal, subjective, or ascribed to a certain body. In her elaboration of passive and active vitalisms, Colebrook emphasises that Deleuze and Guattari’s passive vitalism prioritises sense (understood as an “impersonal, neutral, sterile, inorganic” (Colebrook 2010, 3) potentiality for connections not limited to any particular entity) over meaning, which is always organised and specific to a certain body. These conceptualisations (of sense and affect) play a major role in the passive vitalist understanding of life: as an impersonal potential of forces of differentiation that are neither limited to actualisation in the form of

synthesis, nor contained within the boundaries of specific bodies. They do not enliven inert matter, but are matter's own capacity. This idea of life as affectivity and the power of differentiation is, in Deleuze and Guattari's work, directly connected to the question of philosophy as an expression of life and its "apprehension" (Colebrook 2010, 22). In the following section, I focus on Deleuze and Guattari's understanding of philosophy, science, and art, and, in particular, on the way in which Deleuze conceptualises art. It is their problematisation of the relation between these three areas that sheds further light on the specificity of bioart.

3. From Affect to Art

3.1. Art, Science, and Philosophy

In *What Is Philosophy?* (1994), Deleuze and Guattari talk about three ways of thinking or three modes of protecting ourselves from chaos: philosophy, science, and art. Each offers a specific way of engaging with chaos, that is, the multiplicity of forces, materialities, and ideas: "infinite *variabilities*, the appearing and disappearing of which coincide" (Deleuze and Guattari 1994, 201; italics in the original). Philosophy, they argue, is the creation of concepts that are designed to work through certain problems (showing possible paths towards the way out rather than giving ready solutions); science is concerned with functions expressed through propositions and discursive systems; and art struggles with chaos by creating and preserving percepts and affects that do not belong to the human subject – they "are beings whose validity lies in themselves and exceeds any lived" (Deleuze and Guattari 1994, 164). In this way, all three disciplines, or the *Chaoids* – "the realities produced on the planes that cut through the chaos in different ways" (ibid., 208) – not only engage with and order chaos, but also discern certain elements from it, create new ones, and recompose the multiplicity of forces and ideas. Although each of the Chaoids has its own method of approaching chaos and is concerned with different aspects of it, they all confront the same

multitude of variabilities and pose analogous issues. As Deleuze and Guattari claim, this struggle with chaos is followed by “a more profound struggle against opinion” (ibid., 206). Thus, all three forms of thinking are both critical and creative practices. Interference among these three different planes is also of interest; according to Deleuze and Guattari, interference takes place when one discipline borrows methods and/or objects from another, for instance “when an artist creates pure sensations of [philosophical] concepts or [scientific] functions” (ibid., 217). More specifically, Deleuze and Guattari talk about three types of interference between the disciplines: (1) extrinsic interference, when, for example, a philosopher concentrates on an object from a different plane (a sensation from art or a function from science) and creates the concept of this object (that is, she uses her own method); (2) intrinsic, when an element from one discipline (e.g. a concept from philosophy) moves to another field (science or art); and (3) non-localisable interference, which takes place when a discipline meets or confronts its own outside (that is, “in relation with a negative” (Deleuze and Guattari 1994, 217–218)). These sites of interference are where inventiveness of thought happens. Meeting the outside, that is, a different discipline and a different way of thinking (and, thus, engaging in a specific interference) mobilises the creativity of each field. Deleuze emphasises this aspect when he talks about philosophy and, in particular, its relation to art:

It is because philosophy is born or produced outside by the painter, the musician, the writer, each time that the melodic line draws along the sound, or the pure traced line colour, or the written line the articulated voice. There is no need for philosophy: it is necessarily produced where each activity gives rise to its line of deterritorialization. To get out of philosophy, to do never mind what so as to be able to produce it from the outside. The philosophers have always been something else, they were born from something else. (Deleuze and Parnet 2002, 74)

In this way, philosophical inventiveness takes place outside, or external to, philosophy: it is produced in its encounter with non-philosophy, with other strategies of confronting chaos. Furthermore, as Deleuze underscores, “philosophy needs not only a philosophical understanding,

through concepts, but a nonphilosophical understanding, rooted in percepts and affects. You need both” (Deleuze 1995, 139). Bioart forms such a space for an encounter: it is here that the plane of art – where forces and intensities are captured in the form of percepts and (often visceral) affects – intermingles with science (taking scientific procedures as its object and material) and philosophy (bolstering the creation of new concepts).⁸⁶

In the register of physics, interference occurs when two or more waves overlap, which results in the creation of regions of increased and decreased amplitude (or, in other words, in the creation of patterns of difference).⁸⁷ Keeping this in mind, one may understand the interference of philosophy, science, and art as a critical and inventive site, where dynamic differences among these disciplines are worked through and allow for the creation of new patterns of interference: new concepts, functions, and sensations. Deleuze and Guattari note that this potential for interference, for an encounter and entwinement with other planes, accompanies each discipline: “concepts, sensations, and functions become undecidable, at the same time as philosophy, art, and science become indiscernible, as if they shared the same shadow that extends itself across their different nature and constantly accompanies them” (ibid., 218). Furthermore, philosophy, science, and art are linked by their potential for opening up, imagining, and creating a future: “there is extracted from chaos the shadow of the ‘people to come’” (ibid., 218). In her discussion of Deleuze’s and Deleuze and Guattari’s conceptualisation of art, Grosz emphasises their understanding of art (in its variety of forms and along with philosophy and science) as “capturing *the force of time*” (Grosz 2008, 86; italics in the original) and opening it up towards new becomings and forces of differentiation. More specifically, art is that

⁸⁶ An example could be the concepts proposed by the TC&A: the “semi-living” or an ontology of the “Extended Body,” which I address in Chapter Two.

⁸⁷ Haraway (1997) and Barad (2007) explain the idea of interference (which they also call diffraction) as opposed to reflection, which results in a “faithful” representation or displacement of the same image. They employ the concept of diffraction/interference as a metaphor for a methodology that pays minuscule attention to the “patterns of difference,” that is, to how bodies and meanings are made and how they matter.

which renders time sensible “not in order to control or understand duration (which cannot be controlled and is that which ensures that the self-identical is always transitional, always other, never actual) but to live it as one can, even if that means becoming-different” (ibid., 87). As she further explains, this does not mean that art freezes time in any way; rather, that it transforms it through “the invention of new techniques, new forces and energies” (ibid., 87). Bioart borrows techniques and materials typical of science and bioengineering (like tissue culturing), and combines them with artistic methods – focused on the extraction and capturing of affects, qualities, and forces – while literally moulding the temporality of organisms or their fragments that form part of a bioartwork.

3.2. On Excess and Art

Grosz’s conceptualisation of art stems from her reading of Deleuze and Guattari’s idea of art as the extraction of sensations from the forces of the universe on the one hand, and Charles Darwin’s notion of sexual selection, on the other. Sexual selection is an evolutionary mechanism (and a form of natural selection) that enables organisms to develop features that can increase their chances of finding a mate. However, some of these special features tend to threaten the organism’s survival as they may attract the attention of predators as well as potential sexual partners. Grosz reads Darwin’s sexual selection through Irigaray’s theory of sexual difference.⁸⁸

⁸⁸ As Luciana Parisi (2010) argues, there is an internal tension in Grosz’s work. On the one hand, she provides an original, rich and acute reading of Darwin (through Bergson, Nietzsche, and Deleuze), which focuses on matter as the foundation for pure difference, dynamic transformation, and self-overcoming; an open-ended, non-teleological, and non-linear understanding of evolution (neither determined nor unconstrained), a critique of essentialism, human exceptionalism, and the progress narrative. On the other hand, Grosz retains Irigaray’s ontology of sexual difference, based upon two sexes, which seems to contradict the emphasis on multiplicitous differentiation that she finds in Darwin. Thus, Parisi claims, “If Darwin’s model of evolution is embedded in metaphysical time, which admits that the future of life is open to increasing differentiation, then to ground such differentiation into the specific form of sexual difference will admittedly deny the unpredictability of virtual sexes” (2010, 155).

the capacity to attract sexual partners is fundamentally linked to sexual bifurcation, the bodily differences – whatever they might be – between males and females and the various categories of bodily form all living bodies approximate. It is this difference that attracts, allures, appeals, though it does not do so in predictable or clear-cut ways. (Grosz 2008, 7n6)

And further,

The haunting beauty of birdsong, the provocative performance of erotic display in primates, the attraction of insects to the perfume of plants are all in excess of mere survival, which Darwin understands in terms of natural selection: these forms of sexual selection, sexual attraction, affirm the excessiveness of the body and the natural order, their capacity to bring out in each other what surprises, what is of no use but nevertheless attracts and appeals. Each affirms an overabundance of resources beyond the need for mere survival, which is to say, to the capacity of both matter and life to exchange with each other, to enter into becomings that transform each. They attest to the artistic impact of sexual attraction, the becoming-other that seduction entails. (Grosz 2008, 7)

What she takes from Darwin's theorisation of sexual selection is the excessive character of the creation of qualities that are unnecessary and often impractical in terms of survival. These qualities of colour, sound, and smell turn into sensations.

Art comes from the excess, in the world, in objects, in living things, that enables them to be more than they are, to give more than themselves, their material properties and qualities, their possible uses, than is self-evident. Art is the consequence of that excess, that energy or force, that puts life at risk for the sake of intensification, for the sake of sensation itself – not simply for pleasure or for sexuality, as psychoanalysis suggests – but for what can be magnified, intensified, for what is more, through which creation, risk, innovation are undertaken for their own sake, for how and what they may intensify. (Grosz 2008, 63)

In this way, art distils qualities from chaos and produces sensations: it “elaborates the possibilities of new, more, different sensations than those we know” (ibid., 79). It should be underlined that sensations, affects, and

percepts are understood by both Deleuze and Grosz not as the sensations experienced by a particular subject (an individual), but as forces that exist and move in the universe and that are extracted from it and captured by art. As Grosz explains, affects and percepts are received by a living being (in its physiological and neurological sense) and transduced further onto the world itself (ibid., 71). Despite the differences between various forms of art, their histories, specificities, and contexts, the common denominator, according to Grosz, is their capacity “to conjure up in words, paint, stone, steel, and melody, invisible and soundless forces, what is incapable of being represented otherwise” (ibid., 81). In its different forms, art produces, channels, and simultaneously amplifies sensations. It does not represent or signify; instead, it exposes intensities and forces. This is also why, Grosz argues, paradoxically, art is “the least representational mediation” as it enables the experiencing of sensations “most directly” (ibid., 73) as they circulate between the body of the artwork and the bodies of the audience. Neither Deleuze nor Grosz poses the question of what art means (or, what it represents in a traditional sense); rather, they ask what it does.

Art approaches chaos – this “unpredictable and uncontainable overspilling of forces” (Grosz 2008, 77) – in its own unique ways: it extracts qualities and sensations, rearranges, melds them with one another, and generates new sensations. Art engages with that which is itself dynamic, changing, yet uncontainable and, as a result, reveals the excess of the multiplicitous processuality and differentiation of material forces. In other words, what is at stake in art are the very processes of becoming. Bioart captures the forces of the non/living; it transduces, alloys, reshuffles, and recirculates intensities of matter; it exposes them and renders their surplus comprehensible. Deleuze’s theorisation of the relation between affect and art, and Grosz’s argument that art is that which intensifies and produces sensations, while revealing the inherent excessiveness of material processuality, shed light on the aesthetic of bioart: its capacity to capture the forces of the non/living, reassemble them, and make them perceptible.

Feminist materialist and posthumanist theories, along with the work of Deleuze and Guattari, and those philosophers upon whose writings they draw, enable a close and meticulous examination of the traditional conceptualisations of matter and life that have shaped our culture (with its mechanisms of oppression and exclusion) and understanding. When combined with an attentive analysis of the two aspects of contemporary debates on the question of life – biopolitics and neovitalism – Deleuzian feminisms open up the way to a critical and creative, yet rigorous, theorising of life as something that is no longer modelled on the human subject or compartmentalised in the self-contained bodies of living organisms. Thus, Deleuzian feminisms provide me with theoretical tools and bolster the creation of concepts. In my analysis of selected bioartworks in the following chapters, I employ the concept of the non/living, which attends to the enmeshment of life and death and the organic and inorganic, and the concept of uncontainable life, which addresses the potential for excess that is always carried within the processuality of the non/living. Uncontainable life and the non/living enable an attentive examination of the bioartworks in terms of their rendering forces of becoming, of differentiation, and of the uncontainability of life sensible and thinkable, as well as their conceptual and affective potential.

Chapter 2

Towards the Non/Living

*It is the end of January 2013, and I have been in Finland for three days. I am one of five non-local participants attending the four-day-long Biotech for Artists Workshop organised at Biofilia, a new wet biology lab run by an art school. The workshop itself is (partly) directed by Oron Catts, a Tissue Culture & Art Project (TC&A) member. It is my first hands-on engagement with the practices I have been researching. It is only on day four – after building DIY lab equipment, dealing with DNA extraction and related tools of the trade like the pGLO transformation of *E.coli* bacteria, and animal and plant tissue culturing – that we all stop to discuss the ethical and onto-epistemological issues concerning our activities in the workshop. During one of the breaks, Ionat Zurr, the other member of the TC&A duo, invites us to take a look at her ongoing research project. This “taking a look” amounts to gathering around a microscope. She places a laboratory dish containing a pinkish liquid and mouse skeletal muscle cells under the microscope and explains the research she is doing. The key question is movement. “If we are lucky enough” – she continues – “we might be able to see [the muscle cells] twitching.” Everyone is tensely waiting (with cameras poised). Suddenly, one of my colleagues shouts: “It moved. Look, it’s moving! Again! It’s alive!”*

1. Bioart and the Curious Case of the Tissue Culture and Art Project

Tinkering with life, reassembling matter, and provisionally cutting out new entities also means creating new subjects (not only objects), as Braidotti would claim. These *queer critters* (Barad 2012a) or new living bits (framed by the TC&A artists as the “semi-living” or the “partial objects of life”) are subjected to the decisions made by the artists and sometimes the audience. As Eduardo Kac (2007b, 20) observes, bioartists make use of the two processes crucial in the context of biology: ontogeny

(organism development) and phylogeny (the evolution of the species). Bioartists also utilise an extensive range of the living – nucleic acids, proteins, viruses, bacteria, and complex vertebrates. It is these living “bits” that are used and manipulated by each bioartist according to her or his own agenda. Throughout the past twenty years there has been an increasing number of bioartworks, and commentaries by both artists and critics, that argue for the importance of the question of life, its manipulation, and related ethical dilemmas in the context of contemporary technoscience. In this chapter, I concentrate on the Tissue Culture and Art Project and the ways in which their series of works, *Victimless Utopia*, exposes the processual enmeshment of life with death and the organic with the inorganic, which I call *the non/living*. I suggest that renaming what we conventionally call “life” as the “non/living” is a more adequate way to articulate the dynamics and necessary intertwinement of the processes of living and dying and growth and decay (for example, in the case of the contamination of a tissue culture with bacteria, the multiplication and growth of the bacteria is entwined with the decay and death of the infected tissue). Thus understood, the non/living forms part of life’s uncontainability. In the following sections, I present the historical background of the TC&A, its methods, and the ways in which the duo narrate their artistic practices, as well as introduce the TC&A’s *Victimless Utopia* series. Subsequently, I concentrate on the non/living by combining my examination of the TC&A’s works with a broader outlook on the scientific debates around the relation between the organic and inorganic and the origin of life. Finally, I link these analyses with my experiences at Biofilia, a bioartistic laboratory in Helsinki (Finland), where one of the TC&A’s members, Ionat Zurr, conducted her experiments on mouse muscle cells’ capacity for movement. This allows me to look more closely at affect as forming part of the non/living. Hence, my primary aim in this chapter is to approach bioart as a field that operates as a plane of thinking – one that creates concepts, percepts, and affects in order to address certain problems – instead of prioritising the history or aesthetics of bioart. Although, according to Deleuze and Guattari, art is primarily about percepts and affects, I argue that bioart,

read biophilosophically and through feminist theory, allows one to rethink and reconceptualise life.

A critique of anthropocentrism is often what is at stake in bioart; however, there is always a risk of it becoming a performative contradiction: despite their declarations of doing away with anthropocentrism, artists exercise power over nonhuman entities, which become the raw material that is manipulated and killed in the name of art. Since there is always a chance of falling prey to this risk, it is important to examine non-philosophical strategies of eliminating human bias, and their potential for imagining non-anthropocentric and non-speciesist⁸⁹ understandings of the non/living and of ethics.

Bioart subverts the idea of separation between different fields and disciplines. It carries the potential to examine possible futures (in a techno-scientific, but also an ethico-political sense) and the “not-yet-thinkable.” Bioartworks form a playground where not only are ideas of the non/living, reframed in the contemporary scientific and technological context, tested, but also the supposed objectivity and neutrality of science and technology are problematised. In the artistic research that forms part of the preparation for their projects, bioartists often pay special attention to the questions of which actors are invested in the scientific procedures and technologies that are used by the bioartists themselves, and in what ways. Thus, artistic projects may shed light on, for example, commercial investment in research on the bioengineering of meat. The non/living and the relations between the natural and cultural, and life, technoscience, and advanced capitalism are core problematics posed through the work of the Tissue Culture and Art Project. Before I engage with the idea of thresholds of the non/living in TC&A’s works, and the ways in which TC&A challenges the problem of life on both the onto-epistemological

⁸⁹ Despite the close link between non-anthropocentrism and non-speciesism, I do not see these two notions as synonymous. Non-anthropocentrism refers to a perspective that does not position the human as the central and most important species on Earth. Non-speciesism describes an approach that refuses to adopt the logic of speciesism, which ascribes different value and rights to individuals only on the basis of their being a member of a certain species, which also involves an active discrimination against the individuals of other species.

and ethico-political levels, let us review the history of the TC&A and its most “iconic” works.

1.1. The Tissue Culture and Art Project: Historical Background

Ionat Zurr and Oron Catts founded the Tissue Culture and Art Project in 1996. It was initiated as “an on-going research and development project into the use of tissue technologies as a medium for artistic expression” (TC&A 2001) and was realised in collaboration with the Department of Anatomy and Human Biology, University of Western Australia (UWA) and the SCITECH Discovery Centre. Since the beginning, one of their major concerns has been “the seamless interaction between living entity and non-living entity outside of the human body” as well as the blurring of boundaries between organisms and their milieu (TC&A 2002). Through their works, Catts and Zurr interrogate the notion of living matter and its agentiality, and death, while looking at how the connections and relations between entities play a substantial role in the formation of these entities. Moreover, the artists concentrate on both the aesthetic and cultural aspects in addition to elaborating the basis for an ethics concerning the manipulation of living matter and its merger with non-living systems. The TC&A can be traced back partly to Catts’s thesis, which deals with the issue of designed biological objects; future possibilities for their use outside of medical science and agriculture (e.g. a custom grown living surface); and the environmental and socio-cultural implications of such an undertaking (TC&A 2002). Furthermore, the artists pose the question of how the use of semi-living products may affect the risks connected with both new and old technologies. In addition, they ask how shifting the mode of production from manufacturing to growing may influence the environmental issues linked both to the processes of both production and consumerism broadly considered.

This aspect seems to be even more significant in the context of current scientific attempts to grow “laboratory burgers.”⁹⁰ In 2013, physiologist Mark Poster and his team at Maastricht University (The

⁹⁰ See e.g.: Ghosh 2013; Ghosh 2015.

Netherlands) revealed the outcome of their research: a stem-cell beef burger, which was presented and evaluated by food experts in London. At the time, the cost of producing such a burger was \$330,000.⁹¹ Two years later (in 2015), it had dropped to \$11 per burger (Stone 2015, n.p.). Together with food technician Peter Verstrate (who is also an interim business unit director at Hulshof Protein Technologies, a company producing beef and pork proteins), Poster and Maastricht University have already launched *Mosa Meat*, a company that aims to improve the technology of growing animal meat in the laboratory and further reduce the costs so that bioengineered beef becomes commercially available within the next five years (Ghosh 2015, n.p.). Laboratory-grown meat seems to be a long-awaited alternative from the point of view of environmental science experts. In a context where animal agriculture is responsible for 51% of worldwide greenhouse gas (GHG) emissions,⁹² the bioengineering of meat brings hope for a substantial reduction in the environmental costs: according to Hanna L. Tuomisto and M. Joost Teixeira de Mattos (2011), culturing meat in a laboratory may reduce GHG emissions by 78–96%, land use by 99%, and water use by 82–96% in comparison to traditional animal farming (the percentages vary depending on the specific type of livestock). However, as Poster admits (and as the TC&A artists endlessly reiterate), growing animal tissue in a lab is not a cruelty-free procedure: it involves the use of foetal calf serum as an essential medium for culturing the tissue. Poster hopes to develop a synthetic or plant-based alternative for the calf serum in the future, but it is worth remembering that currently laboratory-grown meat is not an

⁹¹ See: Maastricht University 2015.

⁹² See: Goodland and Anhang 2009. As these authors indicate, in *Livestock's Long Shadow* (LLS), a 2006 report by the United Nations Food and Agriculture Organisation (FAO), it is estimated that animal farming is responsible for 18% of worldwide GHG emissions. This evaluation, according to them, is not accurate as it both underestimates and overlooks GHG emissions related to such factors as: animals' respiration; land use; undercounting of methane emissions; increase in livestock production (since 2002 as that was the data that the FAO's report was based on); undercounting of livestock in the official statistics (evaluated by the FAO in a different report from 2003, but not taken into account in LLS); not including the data concerning livestock-related deforestation and the fishing industry, among others (Goodland and Anhang 2009, 11–15).

“innocent” product, it involves the procedure of killing: foetal calf serum is produced from the blood harvested from bovine foetuses that have been removed from the bodies of a slaughtered cows. This non-cruelty-free aspect of culturing meat is often overlooked by the media and animal rights activists, like Ingrid Newkirk from PETA,⁹³ who enthusiastically advocates it as an “animal-friendly” version of meat.⁹⁴ In their commentaries and work, the TC&A’s artists emphasise that such an uncritical and non-reflective vision of a utopia in which all meat is grown in laboratories seems to be a gesture that is rather naïve, intrinsically humanist, and inscribed in the logic of capitalist consumerism, which involving the transposition of the violence onto a less visible level by hiding the actual victims. Furthermore, they suggest that tissue culturing and the production of semi-living entities on a massive scale could lead to the emergence of a “new class for exploitation” (Catts and Zurr 2006, 5), where the exploited are not necessarily fully developed complex organisms but, instead, their fragments: cells and tissues. Note that the TC&A’s category of the semi-living, which describes an entity composed of living cells/tissues and non-living materials (biopolymer scaffolding), is also a form of what I call the non/living. In this context, we may ask whether the “new class for exploitation” invoked by Catts and Zurr is in fact only a future scenario. Does it not, rather, form part of the present in which the non/living (of different kinds: cells, tissues, nucleic acids, proteins, etc.) is already being manipulated and manufactured by both science and industry?

The question of designing or growing semi-living objects, which TC&A explores, is related to the field of tissue engineering. Before I proceed further, I will provide a brief historical background to tissue culturing itself. Considerations of life as “technology,” or more precisely “technologies of living substance” (Landecker 2007), that give rise not

⁹³ See: Newkirk 2013.

⁹⁴ It is striking how often this aspect of the “hidden victims” of tissue engineering remains ignored and is completely omitted from the discussions about the possibilities of growing synthetic meat in the media, which often uncritically suggest that laboratory-grown meat may be seen as a vegetarian/vegan alternative. See: Baggini 2013.

only to the idea of the manageability and manipulation of living matter (at a molecular level), but also contribute to the birth of biotechnologies, may be traced back to the very end of the nineteenth century when Jacques Loeb and other biologists were conducting their research on the physicochemical basis of life (ibid., 5). This research was particularly hypostasised in the work involving the *in vitro* culturing of tissues that have been isolated from their parent organisms. The growth of tissue outside of the body was demonstrated for the first time in 1907 by Ross Harrison, an American embryologist. Whereas Harrison proved that the fragments of tissues could be sustained in a special, nutritious medium in a sterile container for a couple of weeks, Alexis Carrel, a Franco-American surgeon who conducted his research on cells and tissues, succeeded in developing methods to sustain living tissue that was (almost) “immortal” or “permanent.”⁹⁵ Since then the culturing of tissues has advanced, become standardised, and is widely employed in biomedical research;⁹⁶ it now forms one of the most important areas of biotechnology and this shift in importance has greatly affected the understanding of the cell and the body by both science and culture (ibid., 13).

Tissue bioengineering draws attention to several issues that are crucial to the question of the non/living. Firstly, it points to the processual

⁹⁵ Landecker comments that one of the most notable examples is the culture of chicken heart cells that was grown and sustained in Carrel’s laboratory during the years 1912–1926 (2007, 16).

⁹⁶ For instance, this can be seen in the field of studies on viruses (since cultured cells may serve as a means to produce the large amounts of viruses employed in vaccine research). Furthermore, the first human cell line (HeLa, named after the person Henrietta Lacks, who – without her own knowledge or permission – became the donor of the employed cells) was developed in 1951 in Baltimore by George and Margaret Gey. Due to techniques such as the freezing of cell cultures, the HeLa cell line has spread around the world over the past few decades. Additional experiments during the 1960s resulted in the creation of hybrid cell cultures (both the cells’ cytoplasm and nuclei contained genetic material from different species). In this way, both the idea of immortality and the malleable and generative character of living matter were seen in a new light (Landecker 2007, 180–203). It should be underlined that the case of Henrietta Lacks, a poor black woman who died in 1951 of cervical cancer, demonstrates how the issues of gender, race, and class (and the related exploitation) are woven into and played out in the history of medical research, experimentation, and practice (see: Skloot 2010).

character of non/living matter: structures and functions are framed as the “processes of duration” (to follow Ludwig von Bertalanffy (1952) cited in Landecker (2007, 13)), and physicochemical and biochemical processes are understood as the foundations of life. Secondly, tissue culturing demonstrates plasticity as an essential characteristic of non/living matter: its capacity to be altered and manipulated without resulting in its “death,” and its unpredictable metamorphoses, transformations, and developments. Thirdly, cell lines and tissues grown in the laboratory expose temporality and duration as key features of life: generative processes (physicochemical and biochemical in nature) extend far beyond the lifespan of an organism, or even a generation. Furthermore, all these aspects deeply problematise the conventional understanding of both life and death.

Let us return to the history and context of the TC&A. In the case of its work, the bioengineering element mainly involves constructing degradable, bio-polymer scaffoldings onto which the appropriate cells are placed and provided with proper nutrients and optimal growth conditions. As I have already mentioned, creating semi-living sculptures – like any procedure that involves tissue culturing – requires the use of bovine foetal serum as a nutrient and, at times, cat gut suture. It is currently impossible to replace the serum with a synthetic substitute, which does not make the process cruelty-free (the victims, unborn cows and their mothers, remain hidden). In this context, it might be interesting to think about Alfred N. Whitehead’s notion of life as “robbery” (proposed in his reflections upon the relation between the living and non-living), which highlights the fact that everything that lives also robs other systems (both organic and inorganic) in order to survive. For example, if it needs food, it requires “the destruction of elaborate societies derived from the environment” (Whitehead 1978, 105). The non/living comprises a multiplicity of processes and transformations of matter that are enmeshed with one another and that involve both composition and disintegration.

Employing tissue bioengineering and related technologies as a medium for artistic creation allows TC&A to produce “tissue sculptures” or “semi-living” objects. The cells are chosen according to their “artistic

quality” (meaning their utility for a particular piece), and cultured on artificial scaffoldings in bioreactors (Catts and Blunt 2001, 134–135). The primary aim is to sustain these semi-living sculptures of different geometrical shapes, complexity, and sizes, “for long periods,” as TC&A states and, in this way, to create a new class of artistic “objects” which “blur the boundaries between what is born/manufactured, animate/inanimate and further challenge our perceptions and our relations toward our bodies and constructed environment” (ibid., 135). This blurring of boundaries, including the boundary between what is deemed living and non-living, as Catts and Zurr strive to show through their work, is directly linked to the ways in which we approach the non/living. It disturbs the clear-cut division between things that are alive and thus require an adequate ethical response and possibly care, and mere non-living objects which do not involve the same approach. Thus, TC&A’s artworks, which are composed of living cells and inorganic materials and are entirely dependent on the laboratory setting (sterile conditions, nutrients, etc.) not only contest the traditional split between life and non-life, but also influence the question of ethical relations with such hybrid objects. In other words, TC&A’s semi-living sculptures problematise the ontological and ethical threshold between the two realms of the living and the non-living and, hence, the specific values ascribed to each of them, and relevant ethical approaches. TC&A’s bioartworks dwell at that threshold and show that the non/living cannot remain contained within clear-cut categories. As tissue cultures are the colonies of cells growing outside of the host organism, the sculptures are also meant to contest the traditional understanding of the body and, consequently, to make us question our relation with differently (dis)embodied forms of the non/living.

Apart from ethico-onto-epistemological questions about the thresholds of the non/living, matter, and embodiment, Catts and Zurr tackle the issue of the patenting of living organisms (or fragments thereof; for example, tissues), the accompanying discourse of copyright, and the utopian (or, rather, dystopian), yet popular, ideas of fabrication, manageability, and full control over life. Through their commentaries and

artworks the TC&A artists critique the increasing domination of the so-called engineering mindset⁹⁷ in the natural sciences. Such a “single engineering paradigm” involves an attitude that sees the fields of nanotechnology, synthetic biology, geo-engineering, cognitive engineering and neuro-engineering as means of guaranteeing (future) control over living matter and, thus, enabling scientists to “monopolise life” (Catts and Zurr 2012b, 151). It is here that irony employed as an artistic strategy enables them to problematise, undermine, and, in a way, ridicule transhumanist dreams: they use biotechnological tools and create objects that could qualify as examples of biodesign (and, by employing the same tools and procedures, they also mimic the standard bioengineering process), not with the aim of finding new technological solutions but, rather, to expose the logic of the “governing of life” predominant in the field of tissue engineering and biodesign.

The support given to TC&A by numerous Australian scientific and artistic institutions and funding bodies helped it to continue with its project. In 2000 the artists, accompanied by Miranda Grounds and Stuart Bunt, set up SymbioticA, a scientifico-artistic research laboratory based in the School of Anatomy and Human Biology at the University of Western Australia. SymbioticA’s aim is to “create a space for artists (and other non-biologists) within a biological scientific department to engage in critical research in an experimental way with the manipulation of living systems or parts of living systems” (Catts and Zurr 2003b, 9). The lab forms a space where artists work together with scientists, where they gain both knowledge and critical perspectives on the practices with which they engage and on the ethico-epistemological implications of tinkering with life. For scientists, SymbioticA opens up an opportunity to look upon their own practice from a different angle – in this setting, they collaborate with the artists and engage with the non/living in a more open way: by paying special attention to the relationality between the non/living and its context, without the constraints of strictly designed experiments that need to fulfil the requirement of being replicable, and without the imperative

⁹⁷ See: Catts and Zurr 2012a.

of efficiency that often accompanies the work of scientists and engineers. Every day both the artists and scientists face the challenge of making ethical choices. Each case requires attending to the minuscule details of its particular context. Every procedure that takes place in the lab has to follow the ethical guidelines set by the university. However, new projects realised at SymbioticA continue to bring additional challenges to the UWA bio-ethical committee. Interestingly, Catts and Zurr (as representatives of SymbioticA and UWA, broadly speaking) have recently collaborated with Aalto University in Helsinki (Finland), where they contributed to founding the Base for Biological Arts “Biofilia,”⁹⁸ which I visited at the beginning of 2013 in order to take part in the Biotech for Artists Workshop given by Catts and laboratory manager and scientist, Marika Hellman. The workshop, which gathered artists and theorists from various backgrounds, allowed the participants to “get their hands dirty” and work with the tissue culture techniques in a direct way. Such an unmediated experience gave me a lot in terms of both the practical knowledge of the tools of the trade and the critical assessment of and reflection on the practices in which I have engaged. Biofilia officially opened at the beginning of February 2013 and is known as the world’s only fully equipped wet biology laboratory operated by an art school and physically located in an electrical engineering department.

1.2. Ontology of Tissue Cultures: a Story of the In-between

Projects realised by TC&A (but also, in principle, by SymbioticA and Biofilia) form a space in which both the artists and the audience take part in making decisions concerning the existence of an art piece – its sustenance (by guaranteeing the required care and adequate conditions) or its terminal death. Killing an artwork, which may also be seen as a very particular gesture of care, can be accomplished by touching it and, thus, contaminating it with microorganisms (bacteria, viruses, fungi), or by using chemical solutions. While contamination leads to the decay and death of individual cells and fragments of the tissue, it does not equate

⁹⁸ See: Taipale 2013.

with the cessation of the material transformations of the artwork, where life is never contained in discrete entities but, rather, unfolds in a multiplicity of directions. The biological matter of the tissue becomes the milieu (in the sense of both dwelling and food) for the infecting organisms. The metamorphoses of the tissue overlap with the growth and metabolism of the contaminants, while blurring the contours of each of these processes. The non/living, as it is exposed in TC&A artworks, appears as ongoing, persistent processes: the death of the semi-living sculptures grown in the sterile space of a bioreactor may mean the thriving of other non/living forms. Watching bioart created by TC&A often involves taking an active position in “the performance of life and death” of the presented artwork. This accentuates the issues of ethics and responsibility (not only of the artists but also – and most importantly – of the audience), which Catts and Zurr repeatedly emphasise.

Furthermore, as the artists themselves point out, their semi-living tissue sculptures do not fit into traditional taxonomic categories. Rather, they occupy a monstrous, undecidable space of the in-between. Catts and Zurr propose an interesting ontological narrative: they see this in-betweenness as a new kind of body, which they interchangeably designate: “a meta-body,” “THE BODY,” or the “Extended Body” (these concepts are used synonymously). The Extended Body refers to organs, tissues, cells, and their components that originally formed part of a complex organism, from which they have been separated, and that continue to live under laboratory conditions and with extensive technological support. TC&A characterises the Extended Body in the following way:

The Extended Body can be seen as an amalgamation of the human extended phenotype and tissue life; the fragmented body that can only survive by technological means: a unified body for disembodied living fragments, and an ontological device, set to draw attention to the need for re-examining current taxonomies and hierarchical perceptions of life. The Extended Body is by no means a fixed, scientifically binding order; it rather is a soft, artistic, and conceptual view of the subject of technologically mediated and augmented life. (Catts and Zurr 2006, 2)

While Catts and Zurr open their definition with a reference to human tissue, they also seem to indicate that the Extended Body is not essentially human:

The notion of the Extended Body can be seen as a way to define this category of life, maintaining the need for classification, while at the same time attempting to destabilize some of the rooted perceptions of classification of living beings. Much of this living biological matter can, in theory, be co-cultured and fused (cell fusion), or share its sterile environment (to varying degrees of success). Age, gender, race, species and location do not play the same roles in the Extended Body as in other living bodies. (ibid., 2)

The concept of the Extended Body, elaborated through TC&A's bioartistic practices, allows them to articulate the relationality and bond between human and nonhuman living beings, but also between the living and the non-living. As they explain, once a fragment of tissue is taken from an organism, a certain body, it becomes a part of the meta-body, which includes "all living tissues regardless of their current site" (Catts and Zurr 2003b, 11). Organs, tissues, and cells may be alive during certain periods of time after the death of the organism. In a sense, from a body-centric perspective, one could see them as a "life after life" or "posthumous life."⁹⁹ The Extended Body is techno-scientifically mediated: semi-living entities, tissue cultures, and stem cell lines would not be able to exist or survive without enormous technological and scientific sustenance. This very apparatus of sustenance forms a bioartistic *parergon*, a prosthesis that equates to the condition of possibility of the semi-living artworks. As TC&A claim, the fragments of tissue participate in the meta-body in the same way as the semi-living

⁹⁹ In her recent work Jami Weinstein (2016) offers the concept of "posthumous life" understood as inorganic, material, and viroid forces that are not dependent on the notion of the human or the subject. As Weinstein explains, her "concept of *posthumous* is meant to capture a broader and more comprehensive repudiation of humanism involving the death of life in its humanistic forms" (2016). Thus, although her theorisation of posthumous life refers to the question of life after "the death of life (as we know it)" in a broader and more complex sense, the non/living of tissues could also be seen as an expression of posthumous life.

artworks. The artists see their ontological framework as a tool that enables one to

question the classification of the world according to humans/animals/non-living entities and look at the semi-livings that are located in between human–animal (cells of humans and animals fused together), human–object (a tissue-engineered construct consisting of human cells) and animal–object (a tissue-engineered construct consisting of animal cells) ... these semi-livings can fall into any of these categories. (ibid., 4)

The ontology of the Extended Body proposed by TC&A seeks to capture that which is located in-between, which no longer belongs to its original site and which may be altered in ways that are different from the potential modifications of these cells and tissues in their original location. One example of such alteration of cells separated from their source organism is the fusion of mouse and human cells used by TC&A in their *Victimless Leather Jacket* piece. To a certain extent, the Extended Body does similar work to my term of the non/living. Yet, as a concept created through specific artistic practices, the Extended Body is primarily focused on fragments of biological matter that – despite being separated from their original organisms – are still framed as bounded entities. Whereas the Extended Body exposes the relationality between these different entities, the non/living underscores processuality. In the context of the non/living, entities are seen as a coagulation of material forces or, rather, as nodes in which intensities intertwine. Thus, they are expressions of these forces. They are themselves assemblages (or multiplicities) and form parts of larger assemblages (like the cell and the tissue), which may also be described as expressions of material forces. There is no fixed frontier between the living and the non-living, the organic and the inorganic, or life and death. They are transformations, processes enmeshed with one another. Thus, the relationality underlined by TC&A can be understood as an actualisation of processuality that is constitutive of the non/living.

As Catts and Zurr demonstrate through their bioartistic practice, the death of an individual (whether of a human or nonhuman kind) is not tantamount to a dead body deprived of life. Instead, the supposed corpse,

disposed remnants, partial objects of (no-longer) life, and pieces of the non/living constitute a terrain in which other materialities flourish: microorganisms that contaminate a semi-living sculpture might be having a feast. As Susan Squier notes: life is liminal (2004).¹⁰⁰ Thus, the meta-body always already forms part of the non/living: a heterogeneous assemblage of the organic and the inorganic, the living and the non-living, and a site of processes, changes, and fluctuations.

1.3. TC&A's Interfering in the Non/living: a Short Overview

Before I proceed to the concept of the non/living as it emerges from TC&A's scientifico-artistic performances, let us pause for a brief review of Catts and Zurr's most well-known series of works entitled *Victimless Utopia*. This series consists of several sub-projects: *The Disembodied Cuisine*, *The Victimless Leather*, and *DIY DVK 01* (the so-called "de-victimiser"). Rather than examining all three parts of *Utopia*, I will focus on the last piece in the series, as it clearly demonstrates (in an almost grotesque way) the paradoxes that dwell in the intersection of cultural imaginaries and the question of life.

The *Victimless Utopia* series aims to tackle the issues of animal consumption (in the form of both meat and leather), exploitation, and commodification. It highlights the biopolitical logic described by Wolfe (referred to in Chapter One): the ongoing growth of phenomena such as industrial farming, with its severe consequences for nonhuman animals, humans, and the environment, is accompanied by a technoscientific fascination with the idea of the "victimless utopia," a world in which biotechnologies (including tissue culturing) and other scientific advancements guarantee the untroubled production of meat and leather

¹⁰⁰ In her book tracing the entanglement between contemporary biomedicine and human life (and the reshaping of the latter by the former, which sets life at a threshold, renders it manipulable and "bare," as Agamben would put it), Squier enlists various cultural, literary, scientific, and theoretical narratives in order to show how, since the beginning of the twentieth century, fiction has accompanied science, and how they have together been shifting the meaning of the human and of life in general (Squier 2004).

without killing nonhuman animals (as exemplified in the research on culturing meat).

The first subproject, *The Disembodied Cuisine* (2003), addressed the idea of growing cruelty-free meat. It started during Catts and Zurr's residency at the Tissue Engineering & Organ Fabrication Laboratory at Harvard Medical School in 2000 as *The Semi-Living Steak* project. The idea for the project came about, in a sense, by accident: the lab appeared to have a problem with an overgrowth of bioengineered tissue, which inspired the resident artists to propose a solution – an artistic project aimed at “growing a steak” by bioengineering pre-natal sheep cells. It succeeded as a project in that the artists managed to grow miniature lamb steaks with the use of biopolymer scaffolding, and it continued thereafter under the name *The Disembodied Cuisine*. It was eventually presented in France, but with the use of frog tissue. Each of TC&A's projects is contextualised by the artists and introduces multiple layers of enquiry – discourses around biosafety, questions about technoscientific innovation and control over life, and the cultural imaginaries around ideas of what constitutes the living, food production, and consumption.

The second part of the series also concerns the consumption of nonhuman animals, but this time in the form of leather goods. The project consists of growing a layer of tissue out of immortalised cell lines seeded on a biodegradable biopolymer scaffolding, which is shaped in the form of a small, stitch-less jacket. The structure is placed in a perfusion chamber that is designed specifically for this purpose with a special dripping system that ensures the feeding of the cells.¹⁰¹ The cell lines used for the original project were of mixed human and mouse origin, and the goal was to achieve a leather-like material (a living layer of tissue in the shape of a miniature jacket), or, to put it simply, “victimless” leather. The realisation of this project has been repeated several times, and an interesting thing happened to a victimless leather jacket exhibited at the Guggenheim Museum in New York. The tissue of the jacket became accidentally contaminated with fungi, which resulted in a substantial

¹⁰¹ See: TC&A, *Victimless Leather* n.d.

malformation of the shape of the sculpture and distressed the curators, who paradoxically found themselves locked into a false logic of exclusive control over life. I analyse this art piece in detail in Chapter Four.

Finally, the third part of the series (and at the same time, probably the most ironic) is *DIY De-victimiser Kit* (2006). The *DIY De-victimiser* is conceptualised as a “vacuum cleaner” for the conscience; that is, a device that can help people deal with their feelings of guilt experienced when consuming meat (dead animal bodies) or after killing a living being through the use of technology.¹⁰² The kit comprises a very basic tissue culture installation and is used to sustain, and in some cases even proliferate and extend, the life of parts of the dead bodies, “at least until the guilt recedes,” as the artists provocatively put it (Catts and Zurr 2006, 8). This “performative installation” consisted of a peculiar “re-life-ing” (or literally, bringing back to life) of fragments of the flesh of deceased animal bodies. Moreover, viewers are invited to take part in the performance by both caring for the tissues and making decisions about which cultured tissues are to be maintained and which are to be killed. An extra layer of complexity is added by the fact that the project was originally realised in Barcelona, in a context where, on the one hand, there is a tradition of bull-fighting and an increasing local critique of the ritual and, on the other, an increasing number of fast food restaurants that specialise in serving beef burgers (*ibid.*, 6).

Catts and Zurr considered their primary goal to be challenging the question of human/nonhuman animal relationships (or, in other words, the hypocrisy of anthropocentrism and speciesism) and the surrounding cultural imaginaries. The death of an animal killed in *corrida* (for “aesthetic” reasons) and of the one butchered for meat (regardless of the symbolic value ascribed in each case) boils down to the same thing: in both cases, the fate of the animal is determined beforehand. The specificity of the Barcelona version of the project, given that it was set up in this particular cultural and social context, consisted of “bringing back to life” fragments of tissue taken from a fighting bull by seeding it onto a

¹⁰² See: Catts and Zurr 2006; Senior 2008, 79–82.

minuscule replica of a souvenir-shop figurine of a bull (ibid., 8). Subsequently, the tissue culture grown from the bull was compared with tissue grown from meat sourced from a slaughterhouse. At the closing performance of the project, the audience was invited to interact with the semi-living objects and, most importantly, to make a decision about which of them (the “*corrida* bull” or the “beef cow”) should be brought back to “its cultural[ly] accepted position of dead meat” (ibid., 8). As the artists remark, *DIY DVK* is an absurd device that discloses our hypocrisy about living and non-living systems in an almost hyperbolic way.

Firstly, the device allows one to sustain “life after life,” that is, to re-life the fragments of bodies that have been previously “killed.” The supposed goal of the artwork – getting rid of the feeling of guilt (which matters more than the death of an animal) – only intensifies the paradoxical (if not nonsensical) character of *DIY DVK* and reveals the discrepancy in our (human, but rarely humane) treatment of other nonhuman animals. The project discloses the inconsistencies and discrepancies in popular beliefs surrounding biotechnology (its possibilities and limitations, expectations towards it, and fears about it). While drawing attention to the importance of the democratisation of knowledge (of bioscience and biotechnology) through its engagement with wet media,¹⁰³ TC&A shows how crucial it is to critically and ethically reflect upon bioartistic procedures. Furthermore, *DIY DVK* demonstrates a shift in the meaning of life. Despite the fact that a bull is killed in a *corrida* fight, its cells may still be alive, they may proliferate, be fed, and sustained. In this way, the life ascribed to the individual is uncontainable: it continues, unfolds, and modulates even after the death of the individual. In *DIY DVK*, the life of the tissue cultures manifests an entanglement of living and non-living, they are the non/living. Furthermore, as various works realised by TC&A demonstrate, life cannot be understood within the frames of individual *bios* and neither is it split between *bios* and *zoe*. Instead, the non/living endures regardless

¹⁰³ This relates to the practices of so-called “DIY bio” or biohacking, which I mention in the Introduction.

of the boundaries of the organism to which it was originally ascribed. It carries the potential for excess that renders it always already uncontainable.

2. Life and Movement: Towards the Non/living

In this section I would like to consider a disproportionately immense problem: what are the frames of what we call life? Or, to be more specific, what are the thresholds beyond which the living is no longer (seen as) life? And finally, what is the relation between living and non-living?

Although some representatives of posthumanist theory do interrogate the idea of life in relation to death and the non-living, it often appears that the organic character of life itself is taken for granted. Whilst discussing possibilities of thinking both life and ethics that are not premised upon anthropocentrism and Enlightenment Humanism, Weinstein (forthcoming) indicates a problematic correlation between organicism and the definition of life (i.e. all structures qualified as “living” are carbon-based). Along with the philosophical problematisation of the relation between organic and inorganic, and among force, matter, and life, she draws on research conducted within the areas of chemistry, synthetic biology, astrophysics, and astrobiology that challenges the common understanding of life by taking into account the possibility of so-called weird life. I would like to focus now on three examples of scientific investigations that explore and question conventional definitions of life: 1) research on so-called extremophiles; 2) research on non-carbon-based life forms; and 3) synthetic biology.

2.1. Beyond Organicism

The concept of weird life, as Weinstein notes (forthcoming), was proposed by the American National Research Council in their report *The Limits of Organic Life in Planetary Systems* (2007) in order to describe entities that possess the primary features characteristic of life, for instance

metabolism but are not carbon-based.¹⁰⁴ Some of these living forms (both in the sense of actual organisms and scientific projections of possible future discoveries) can be categorised as “extremophiles,” that is, organisms that exist in conditions deemed too hostile for most known terrestrial life; for example, in extreme temperatures, high pressures, or exceptionally “salty, acidic, or alkaline brines” (Plaxco and Gross 2006, ix). In fact, the discovery of microorganisms that live in such (extreme from the human point of view) environments as the Antarctic Sea ice fields or high-pressure vents on the ocean floor, feeds the astrobiological imagination and contributes to the search for life forms outside the Planet Earth.¹⁰⁵ The existence of extremophiles on Earth (and perhaps beyond) calls into question the definition of life as we know it. It appears that these living forms may not need oxygen or light – factors that laymen easily associate with a biological understanding of life – in order to thrive. While discussing Chris McKay’s (2004) perspective on the possibilities of finding life beyond Earth, Sarah Kember (2011) proposes a shift from seeing the determination of life in terms of requirements (what criteria life should fulfil) to taking a bottom-up approach by discovering “what life needs,” which can also be understood as an issue of relationality, because it is about how the entity interacts with its environment. The National Research Council’s report remains open with respect to the definition of life, since it does not set out to define it inasmuch as it aims to pose questions and identify possible directions for enquiry. However, the authors indicate one basic condition that allows life (as-we-know-it) to emerge, namely, a thermodynamic disequilibrium of the system (Committee on the Limits of Organic Life 2007, 8). Other possible requirements they consider include a liquid milieu (e.g. water) and the forming of chemical bonds (which also enable the transfer of energy), although the report raises the possibility of the existence of life forms in non-liquid (gaseous or solid) environments.

¹⁰⁴ See also: Toomey 2013.

¹⁰⁵ See: Kember 2011; Idaho National Laboratory 2013.

The data from this report also serves as a point of reference for Martin Hanczyc, a chemist, whose TED talk is used by Weinstein to explore the possibility of non-carbon-based life (forthcoming).¹⁰⁶ In his short lecture, Hanczyc explores the question of the bridge between living and non-living systems by looking at how synthetically modified oil droplets (protocells) express life-like properties.¹⁰⁷ The protocell fulfils some of the basic characteristics of life: it has a body (a specific enclosed architecture), it metabolises, moves, and replicates.¹⁰⁸ In this way, protocells can be understood as expressions of the non/living's processuality. Despite their inorganic structure, they behave like organic entities: they blur the supposedly firm boundary between these two realms. Yet, experiments with protocells are certainly not the only path that challenges our understanding of the relation between the living and the non-living.

There is a body of work within modern biochemistry that is focused on finding the origin of nucleic acids, DNA, and RNA. As Monika Bakke (2012) argues, the so-called clay hypothesis, or the idea that clay minerals may have played a substantial role in prebiotic synthesis, can be traced back to the mid-twentieth century (and the independent work of several chemists: Desmond Bernal, Victor M. Goldschmidt, and Alexander Graham Cairns-Smith). The problem of the function of crystals (i.e. inorganic elements) in the synthesis of RNA polymers is still being studied. Bakke (2012, 60) emphasises that, despite many unsolved questions, it has been confirmed that montmorillonite clay catalyses the formation of oligomers of RNA. Researchers in the field believe that the results obtained may shed light on our understanding of the origins of life. The clay hypothesis may also be linked to the critique of so-called carbon chauvinism (the idea that carbon is the basic and indispensable element building all living matter) that was raised for the first time by Carl Sagan

¹⁰⁶ Hanczyc 2011.

¹⁰⁷ See also: Marchant 2011; Hanczyc, et al. 2007.

¹⁰⁸ In his lectures on the origins of cellular life on Earth, Jack Szostak explains the issue of protocells, their structure, and behaviour. Yet, in contrast to Hanczyc, Szostak sees genetic material (DNA or RNA) as a crucial element of the protocell. See: Szostak 2012.

(1973) over forty years ago.¹⁰⁹ As Weinstein (forthcoming) argues, it is possible to understand carbon chauvinism as an extension of anthropocentrism: we consider the “living” as only that which resembles our own biological processes and structures.

The third example of scientific investigation that challenges the common understanding of what life is, and, at the same time, has had a significant impact on a variety of projects within the field of bioart, is synthetic biology. To put it simply, synthetic biology combines biology, biotechnology, and engineering; it comprises a heterogeneity of methodological approaches and perspectives, which are all concerned with the creation of new biological systems or tools that could be further used for industrial purposes (e.g. the production of vaccines or bioenergy). One of the key areas explored by synthetic biologists is genomics, that is, a sub-discipline of genetics, which involves performing DNA sequencing in order to analyse the structure of the genomes of different organisms. As well as from synthetic biology and bioengineering, genomics is widely applied in medical science. The name often associated with both synthetic biology and genomics is Craig Venter, an American biologist known for being one of the first to sequence the human genome and for creating the first self-replicating synthetic bacterial cell.¹¹⁰ In 2006, Venter launched the J. Craig Venter Institute (JCVI), a non-profit genomic-focused research institution, which is concerned with such areas of study as medicine; microbial, environmental, and plant genomics; synthetic biology; bioenergy; and policy, ethics, and governance.¹¹¹ Interestingly, the institute collaborates

¹⁰⁹ Following Ansell Pearson, we can say that, in *Creative Evolution* ([1907] 1944), Bergson suggests that “it wasn’t necessary for life to assume a carbonic form” (Ansell Pearson 1999, 63). This remark is also considered by Weinstein (forthcoming).

¹¹⁰ The bacterium *Mycoplasma laboratorium* (or, more precisely, a modified version of *Mycoplasma mycoides*) was created by synthesising the bacterial genome and inserting it into another cell. The modified *M. mycoides* has four watermarks encoded into its genome. See: J. Craig Venter Institute 2010; Venter 2010.

¹¹¹ See: The J. Craig Venter Institute 2008a. The institute is also known through the Human Microbiome Project, which is conducted there and which aims to map out the genomes of microbial communities from various sites in the human body. See: The J. Craig Venter Institute 2008b.

with Synthetic Genomics Inc. (SGI), a company founded by Venter and Nobel laureate Hamilton O. Smith to “commercialize genomic driven technologies” (Synthetic Genomics 2012). SGI has exclusive access to the data, research results, and discoveries obtained by the JCVI team.

The creation of synthetic microorganisms and the related experiments conducted by Venter and his collaborators add one more layer of ambiguity to the question of what life is and how it is positioned with regard to the problematic relation between nature and artifice. However, despite this interesting conceptual input, JCVI’s approach to life simply overlaps with what Catts and Zurr call the engineering mindset: life appears in this context as a raw material that can be manipulated, reconfigured, manufactured, and patented for human’s benefit and profit. As Venter says: “These fields [i.e. genomics and synthetic biology] can change the way we think about life by showing that we can use living systems to increase our chances of survival as a species” (Synthetic Genomics 2012). Venter often emphasises the future potential of synthetic biology, but he does so mostly by stressing its employment in the production of biofuels or ridding the world of infectious diseases. However, one may easily notice that life as it is approached by JCVI becomes the axis for a transhumanist-flavoured biopolitical discourse. It can be fully controlled, shaped, and mastered (if not at this point – since Venter’s team admits how difficult and time-consuming the research is – then in the future). Furthermore, let us not forget that what is also (if not mainly) at stake in the case of genomics and synthetic biology is a massive flow of capital. The financial costs of experiments and the current as well as potential income are high. Of course, JCVI is no exception when it comes to close collaboration between science and both commercial industry and institutions. In the neoliberal context, this is common worldwide. This should serve as a reminder for us to always consider the motives that underlie research. As Weinstein (forthcoming) emphasises, and as exemplified by Venter and JCVI, these scientific projects are not undertaken with the aim of dismantling the central position of the human subject. On the contrary, it is the human who manipulates the living substance and is presented as

having exclusive control over it. It is mainly for human benefit that the organic character of life is being called into question. Alternative energy technologies possibly enabled by the use of extraordinary life forms, and the achievements of synthetic biology, may not only be used to “save the human species,” as Venter and his colleagues seem to suggest; there is another significant factor to remember, which is that so-called green technologies already play a substantial role in the global financial markets.

In a similar way to Weinstein’s (2016) integration of science into her argument for an ethics of in/difference, I am invoking the three different, yet interrelated, examples of bioscientific research that challenge the idea of life as-we-know-it (extremophiles, non-carbon-based life forms, and synthetic biology), but not in order to critique their legitimacy or evaluate them on scientific grounds. Instead, I want to ask what they mean philosophically. In other words, how do these scientific revisions of the idea of the living figure in the bioartistic engagement with biomaterials and affect our understanding of life?

While keeping in mind the notion of “weird life” and TC&A’s bioartistic practices, I propose a shift from the idea of life to the concept of *the non/living*. Looking at life as the non/living has several key implications. Firstly, it addresses the question of locating the constitutive characteristics of life. In particular, I am thinking here about two issues: what counts as life and how do we account for life forms that do not fulfil the four basic criteria of the living (the entity has a body; it metabolises; it reproduces; and it is capable of movement) mentioned in the Introduction? The example of viruses shows us that the criterion of reproduction (combined with the passing on of hereditary information) is not necessarily valid because, in order to replicate, viruses need a host cell. An even more striking case is prions, which do not contain any genetic material, or viroids, which consist only of circular RNA. Another example is the consideration of what counts as the foundation for life, or

the critique of so-called carbon chauvinism.¹¹² Secondly, the concept of the non/living takes into account the complexity of the relationship between living and dying (as well as the living and the non-living) – the dying tissues in *Victimless Utopia* project may serve here as one of the most acute expressions (or, enfleshments) of the concept. The death of individual cells and fragments of tissue overlaps with the growth of contaminants: life functions and the very materiality of the tissues become resources for the infecting organisms. It is these tissues that serve as food, dwelling, and support system for the fungi, bacteria, and viruses that contaminate them. Life and death are not separate realms or fixed points. Instead, living and dying are processes: material forces that unfold, intertwine, and express themselves in what we evaluate as life and death. The slash (‘/’) in the term non/living emphasises this entwinement and processual dynamics at work. As Barad explains in the context of her theorisation of time, space, and matter, the potential of the slash lies in its “indicating an active and reiterative (intra-active) rethinking of the binary” (Juelskjær and Schwennesen 2012, 19).¹¹³ Similarly, the slash in the non/living shows that the living and non-living (and life and death) are not a binary opposition, but are intra-active, dynamic, and enmeshed with one another.

2.2. The Twitching of Life

In my attempt to define what the non/living is, I am compelled to attend to the problem of movement. Whether I look from the perspective of biological matter or non-carbon-based forms, the issues of motion, flux, and intensity arise. This brings me back to the opening of this chapter, where I described my experience of witnessing part of Zurr’s latest project entitled *Animating Semi-Living: Muscle Actuators as Cultural Evocative Objects*. The project involves the culturing *in vitro* of rodent

¹¹² Both examples, the weird life of viruses and prions, and the issue of carbon chauvinism are discussed by Weinstein (forthcoming).

¹¹³ Barad underlines this specific potential of punctuation marks and forms of inscription when she talks about “spatio-temporal dis/continuities” (entanglements). See: Juelskjær and Schwennesen 2012.

skeletal muscle tissue. This tissue is then placed in a custom-made bio-reactor and activated into movement. By collecting data about the growth, reaction, stimulation, and actuation of the cells, Zurr and her collaborators are trying to achieve two main goals. Firstly, they hope to investigate how the bioengineered muscle tissue can be approached from cultural perspectives (with a focus on art and the increasingly popular “living” design and architecture) in order to discover how this contributes to discourses about the human perception of movement as an indicator of agency. Secondly, the team is also looking at the growth and use of muscle tissue actuators as “motors” that can generate movement (Taipale 2014). The aims of the project touch the core of this chapter. Reframed in terms of movement, we can now ask: is movement the primary characteristic that “brings life”? The notion of movement is also directly linked to the concepts of process, flux, and becoming, which form part of Deleuze and Guattari’s ontology of life as “radical immanence,” and were later adopted by Braidotti in her version of life as *zoe*.

Describing immanence as radical means that it cannot be immanent to (or contained within) anything else but itself; it may be understood as “the transcendently necessary condition for all life: everything is unified in so far as everything is becoming and flux” (Stagoll 2005, 206). Deleuze’s perspective is substantially indebted to Spinoza’s understanding of ethics, according to which all entities and events are the diverse expressions of one “substance” (or, in other words, life). These different bodies (or, different “modes of substance” in Spinoza’s register) may affect other bodies and become affected by them. It is through these flows of intensity that bodies enter into relations with other entities, and thus increase their power. As Deleuze (1988, 22–23) underlines in his reading of Spinoza, encounters with other bodies are good for an entity insofar as they enhance that entity’s power, dynamism, and composition. They are bad if they diminish the entity’s power and contribute to its disintegration. From the Spinozian perspective, there is no transcendent agent or source of transformation. Rather, there is one radically immanent substance that expresses itself in a multiplicity of ways. This substance is non/living: it is not immutable or rigid but, instead, unfolds through

modulations and affects; it is in a state of becoming, in which the processes of living and dying and growth and decay are always already intertwined.

Bergson's concepts of duration and creative evolution, to which Deleuze refers, also contribute to the characterisation of immanence as "the realm of creative processes and becomings" (Ansell Pearson 1999, 12). In a way, creative evolution itself may be translated into the Spinozian question of "what a body can do," which describes the creative forces of life, continuous, non-teleological processes of invention and re-invention, the essence of which is becoming itself (ibid., 12). Despite the fact that these "creative energies of life," as Ansell Pearson argues, are "canalised in specific bodies" (ibid., 12), those bodies or species are not the final stage or a final goal. Creative evolution in Bergson is ceaseless: it exposes "life's own domain, which is reciprocal interpenetration, endlessly continued creation" (Bergson [1907] 1944, 195). Bergson shows that the notion of movement "which is reality itself" (ibid., 101) is crucial for an understanding of evolution as that which does not have any pre-established goal: "evolution does not mark out a solitary route, ... it takes directions without aiming at ends, and ... it remains inventive even in its adaptations" (ibid., 114). In his reading of Bergson, Deleuze argues that life is understood as the ongoing movement of differentiation, where movement is "explained by the insertion of duration into matter" (Deleuze 1991, 94). Differentiation in this context means the actualisation of the life impetus (*élan vital*) – or, in other words, material forces – in an endless multiplicity of forms: entities, organisms, and processes. As Grosz emphasises in her reading of Deleuze and Bergson, life – this movement of differentiation – can be understood as constantly ongoing processes of invention, or, in other words, "the ongoing tendency to actualize the virtual" (Grosz 2011, 20). Interestingly, the participants in the workshop at Biofilia, as I note in the opening of this chapter, read the twitching of mouse muscle cells as an indication of life, a sign that evoked emotional reactions: "Look, it's moving! Again! It's alive!" as one of my colleagues shouted. Yet, if we consider movement (in its broad sense of differentiation) to be a necessary characteristic of life, we do not

need to look for any specific “signs,” such as the twitching of cells in order to engage with the ontological and ethical questions concerning life. Furthermore, Bergson also argues that our attempts to comprehend life, “the mechanism of the real whole,” may give us partial views on what life is, but they can never exhaust the virtual potential of life: “Analysis will undoubtedly resolve the process of organic creation into an ever-growing number of physico-chemical phenomena, and chemists and physicists will have to do, of course, with nothing but these. But it does not follow that chemistry and physics will ever give us the key to life” (Bergson [1907] 1944, 36). Understood in this way, the processes of becoming refuse to remain contained within discrete, enclosed bodies any more than within the limited frames of theories.

2.3. On the Radically Immanent Non/living

Spinoza’s expressionism and theory of affects, and Bergson’s focus on the creativity of life form the ground for Deleuze and Guattari’s understanding of ontology. In their works, ontology is described as monist,¹¹⁴ yet rhizomatic. It is “reducible neither to the One, nor to the multiple” (Deleuze and Guattari 2004, 23). Here, the multiple is tantamount to univocal. This unity, which comprises both organic and inorganic, animate and inanimate, and natural and artificial – all of which compose the non/living – prioritises interrelations, motions, velocities. The plane of immanence (also sometimes framed as a plane of consistency, of nature, or of univocity) is not constituted by separate (molar) entities categorised and organised according to binary, oppositional divisions. Rather, it emerges together with events, with their accelerations and dynamics, as they take place. Events are produced through the interaction of forces. Furthermore, what operates on the plane

¹¹⁴ Deleuze and Guattari understand monism in a specific way. It equates multiplicity and dynamic difference. As Rick Dolphijn and Iris van der Tuin (2011) emphasise, following Bergson, Deleuze and Guattari “push dualisms to an extreme,” by undoing these dualisms in order to arrive at the “magic formula we all seek – PLURALISM = MONISM” (Deleuze and Guattari 2004, 23). This also means that they work through dualisms with the aim of reaching a horizontal plane of multiplicity: of entities in processes and relationalities.

of immanence is desire understood as a positive “force able to form connections and enhance the power of bodies in their connection” (Ross 2005, 63). In this sense, it is a desire to become, which is of an ontological and not libidinal kind. In this way, the Deleuzoguattarian concept of desire can be explained in terms of affects: intensities that may increase the power of bodies and form connections. Deleuze and Guattari emphasise that desire may also be understood as a force that creates assemblages or multiplicities: “Assemblages are passionate, they are compositions of desire. Desire has nothing to do with a natural or spontaneous determination; there is no desire but assembling, assembled, desire” (2004, 440). Thus, we can say that although desire expresses itself by producing connections and forming assemblages, it is also non-teleological.

Life is understood in this context not as an absolute immanence of the individual lives of subjects but, rather, the immanence of an indefinite life, the absolute singularity of “a life” (Deleuze 2005) acknowledged as impersonal, material flows. Deleuze and Guattari’s conceptualisation of radical immanence as that which is not constituted and defined in reference to an outside, which is immanent only to itself, and which is characterised by becoming (processuality) rather than being (immutable presence), sheds light on the non/living: a enmeshment of the material processes of living and dying, composition and disintegration, and growth and decay, as they emerge in the TC&A’s semi-living sculptures. The non/living of the TC&A’s artworks is not entirely of a biological kind: the life functions of the tissues, their growth, and development take place through their entwinement with technology. In other words, the tissue cultures in the analysed art pieces (like any form of biological matter maintained in a laboratory) require technological support (e.g. sterile conditions, nutrients, antibiotics, etc.) without which they would not be able to survive. The concept of the non/living captures these interconnections, changes, and processuality, while problematising the binary categorisation of life and non-life with which we tend to frame and organise the world. The sculptures demonstrate that living and dying unfold in the same material space and are not isolated from one another.

In a similar way, the human body is also a playground, where cells, tissues, and microorganisms (that is, nonhumans) multiply, grow, degenerate, and die: these processes are simultaneous and interrelated. As a philosophical concept that is created *within the interference* between the Deleuzoguattarian philosophy of radical immanence, bioart, and science, the non/living works through the problem of the blurred boundaries between the living and non-living and life and death by exposing their processual entanglement. In this way, the non/living also sheds light on life's uncontainability: material forces and processes through which these forces actualise and unfold exceed both individual bodies and the boundaries of that which is commonly deemed life or non-life.

2.4. Concluding Remarks

By creating semi-living sculptures and accompanying them with specific procedures and practices involving audience participation, TC&A not only problematises the dominant understanding of life (as a complex of processes common to all organic entities) and the relation between the living and the non-living, but also reveals and challenges our hypocritical and anthropocentric approach to nonhumans. Through their works, Catts and Zurr critique the engineering approach to biomatter and life “as raw material” (Catts and Zurr 2012b, 151) that is increasingly present in the biosciences and related fields. However, this does not mean that their own practices evade all instrumentalisation of the non/living as they clearly involve the manipulation and moulding of the “bits of life.” In a way, this ambiguity in their work sheds light on the manner in which humans relate to the nonhuman in a broader sense: even the modes of relating that aim to be critical of human exceptionalism involve certain forms of subjection and exploitation of the nonhuman (in the form of both the exploitation of bodies and epistemological subjugation).

In this chapter, I have argued for a non-anthropocentric ontology that forms the foundations of a biophilosophical understanding of life, an understanding of life that emerges through the interference of philosophy, science, and bioart. Such an ontology shows that life is uncontainable: it

expresses itself as a processual enmeshment of the living and the non-living; it is multiplicitous; and finally, it carries the potential for excess. While TC&A's sculptures collapse life and death as processes (and not static, discrete moments) that are intertwined with each other and that exceed bodily boundaries, science brings to light the existence of entities that challenge current bioscientific definitions of life. Deleuze's neovitalism shows that life does not require an external impetus; instead, it is understood as a multiplicity of material forces that express themselves in assemblages. It is only through the interference between these three planes and perspectives: philosophy, science, and art that the concept of the non/living can be mobilised. Thus, TC&A's bioartistic practices analysed through the lens of Deleuzoguattarian feminism and in a dialogue with bioscience demonstrate that what we commonly construe as life and death (and life and non-life) should instead be formulated as radically immanent flows, material forces, and the movement of differentiation, or, in other words, the non/living.

Chapter 3

Transspecies Assemblages

1. Life and Bioartistic Performance

1.1. May the Horse Live in Me (2011)

It is 22 February 2011. An audience (of approximately sixty people) has gathered in Kapelica Gallery in Ljubljana (Slovenia) to attend an artistic performance entitled *May the Horse Live in Me* (*Que le cheval vive en moi*) by the French duo L'Art Orienté Objet: Marion Laval-Jeantet and Benoît Mangin.¹¹⁵ The performance consists of two parts: the ethological (as the artists call it)¹¹⁶ and the experimental, combined together in a non-linear way. The ethological part can be described as being an actual meeting and physical interaction with a live horse, representative of “the Horse.” It also serves as an introduction to the main part of the performance. The entire event lasts one and a half hours. It begins with Laval-Jeantet sitting on a hospital bed. Mangin approaches her with a syringe containing three vials of processed horse blood plasma which he injects into her right arm; the blood, drawn from horses used in medical research, has been cleansed of its red and white blood cells, macrophages, and other large elements. The remaining liquid (blood plasma) contains: lipids, hormones, and certain types of proteins, including forty different families of immunoglobulins. Immunoglobulins – also known as antibodies – are species-specific proteins (e.g. human immunoglobulins are a third of the size of equine ones) and function as messengers in the neuroendocrine system. As the artists explain in numerous interviews and comments, the removal of larger elements from the blood makes it safer

¹¹⁵ The performance was filmed and the footage is available on YouTube. See: artorienteobjet 2011.

¹¹⁶ See: Ars Electronica 2011.

for potential use in trans-species transfusion.¹¹⁷ In other words, the cleansing of the blood is performed in order to avoid anaphylactic shock¹¹⁸ when receiving it – in this case, in Laval-Jeantet’s body. Throughout the period of three months immediately preceding the performance, the artist’s body has gradually been prepared to receive the “immunoglobulin cocktail” shot. Every week she has been injected with different groups of horse immunoglobulins so that her immunological system can “memorise” the foreign proteins and its own reaction to them, and thus avoid anaphylactic shock during the final application of horse blood plasma in the Gallery. As Laval-Jeantet explains, the fact that her body remembers the immunoglobulins to which it has been exposed throughout the preceding three months means that during that time it was producing antibodies that were able to eradicate “as many of the immunoglobulins as it could, allowing the extra to interact with the targeted organs, producing the hoped for effects” (Laval-Jeantet and Mangin 2012, 257). Although Laval-Jeantet does not explicitly state what exactly the “hoped for effects” are, she expresses an expectation of some sort of alteration in her physical and mental state resulting from the injection of horse immunoglobulins (for example, fever).

After the injection, Laval-Jeantet lies down on the bed for about ten minutes, during which time the audience watches images showing the artist’s nude torso with drawings of the immunoglobulins and the reactions currently taking place in her blood system superimposed on it, which are projected onto a screen behind her. Meanwhile, as she later explains, she can feel a wave of fever overtaking her body. Subsequently, the ethologist and friend of the artists, Sabine Rouas, enters the gallery space with a black horse. Laval-Jeantet describes Viny’s (the horse’s) character as “too difficult to be of use as a workhorse” (Laval-Jeantet and Mangin 2012, 262), which is why he is available to play a role in the performance. The artist stands up and greets the horse. Subsequently, she

¹¹⁷ See e.g. Laval-Jeantet and Mangin 2012; Ars Electronica 2011.

¹¹⁸ Anaphylactic shock or anaphylaxis is a severe allergic multi-organ reaction, which usually affects cutaneous, respiratory, cardiovascular, and gastrointestinal systems. If not treated immediately, anaphylaxis can cause death. See: Mustafa 2015.

puts on a pair of stilts modelled after a horse's legs, continues to pet the horse and walks by his side around the room, making two circuits. As Laval-Jeantet emphasises afterwards, the stilts bring her face to the level of the horse's eyes, which she interprets as making the encounter friendlier and more equal.¹¹⁹ Although the artist met Viny on a regular basis before the performance in order for them to become accustomed to each other's presence (since, as she mentions, she has always been afraid of horses), she also takes time to familiarise herself with him in the space of Kapelica Gallery. The greeting and petting of Viny, followed by the stroll with him, takes approximately twenty minutes.

After this improvised "ritual of communication"¹²⁰ with the horse, the artists proceed to the second, experimental, part of the event. Thirty minutes after the injection, the biological presence of horse immunoglobulins and other cells in Laval-Jeantet's body reaches its highest level. This is also when another participant in the event, a nurse/artist, takes fifteen tubes-worth of blood samples from Laval-Jeantet. As the artists explain, this "centaur blood" is subsequently lyophilised¹²¹ to prepare it for preservation. Before they freeze-dry all the samples, they can observe how the hybrid blood rapidly coagulates in the petri dishes and tubes. This is intended to serve as proof of the processes that are simultaneously occurring in the artist's body and causing her rising temperature. The formal part of the performance is now over and the audience approaches the artists and the dishes and tubes containing both lyophilised and non-lyophilised, yet solidified, human/horse blood. At the end of the event an emergency doctor checks Laval-Jeantet's blood

¹¹⁹ See: *Ars Electronica* 2011.

¹²⁰ I am using the phrase that the artists employed to describe this more "theatrical" part of the performance, which aims to evoke the cultural imaginaries of horse-human union and interaction.

¹²¹ Lyophilisation or freeze-drying is a method of dehydration used to preserve heat-sensitive and delicate materials. It consists of: 1) freezing the material, followed by 2) the sublimation of the frozen water in the lyophilised material from the solid state directly into the gaseous state. This method is commonly used in the preservation of vaccines, blood fractions, and pharmaceuticals. See: Menyhart 1995.

pressure and leaves her his contact details in case of any sudden changes in her state.

1.2. After the Performance

Later, the artist writes that, for eight days following the performance, she is not able to sleep more than four hours per night.¹²² She also claims that during this time she experiences suddenly shifting feelings of powerfulness, anxiety, and fear, which she considers to be uncharacteristic of a primate (Laval-Jeantet and Mangin 2012, 265). In answer to a question during a Q&A session at the Ars Electronica Prix Forum, she says that she does not have any specific scientific transcripts of her psychophysiological state. Instead, throughout the period of time following the performance, that is, when her body was still affected by the injection, Laval-Jeantet recorded herself on a voice recorder describing her experiences at that moment (Ars Electronica 2011). She does this by naming them as specific to certain species (i.e. typical of a horse versus characteristic of a primate). Such a statement is problematic on at least two levels. Firstly, how can the artist know what horses' experiences are exactly? Her description is only *her interpretation* of what a horse may feel and it relies heavily on an anthropomorphisation of equine behaviour and experience. Human and horse cognitive apparatuses, embodiments, and behaviours and, hence, their experiences, are different. As Thomas Nagel argues in his discussion on the possibility of an objective phenomenology, "At present we are completely unequipped to think about the subjective character of experience without relying on the imagination – without taking up the point of view of the experiential subject" (1976, 449). With regard to the question: "what is it like to be a bat?" which could be generalised in reference to any species other than human, he points out:

¹²² Eight days is the number she notes in the book on AOO (Laval-Jeantet and Mangin 2012). Yet, in other interviews and talks she states that the overall psycho-physical effects only disappeared after two weeks (see e.g. Ars Electronica 2011).

In so far as I can imagine this (which is not very far), it tells me only what it would be like for *me* to behave as a bat behaves. But that is not the question. I want to know what it is like for a *bat* to be a bat. Yet if I try to imagine this, I am restricted to the resources of my own mind, and those resources are inadequate to the task. (ibid., 439)

Thus, what Laval-Jeantet describes as feelings typical of a horse could rather be read as her imagining what it would be like for her to be a horse. Furthermore, the artist's fear of horses may also contribute to her interpretation of what she felt, both during and after the performance. Secondly, Laval-Jeantet's association between the transfusion of blood plasma and the change in behaviour/experience towards something that could be qualified as characteristic of a certain species can easily be linked to the ways in which blood has been regarded across different cultures around the world. Blood, often portrayed as "thicker than water": as a symbol of life and family ties, has played a major role in purity discourses on race, ethnicity, class, nobility, miscegenation, and such practices as eugenics, to name just a few.¹²³ In the cultural imaginaries upon which these discourses rely, blood is portrayed as a carrier of essence. Laval-Jeantet's narrative is invested in these same cultural imaginaries and cultural history of blood.

Each time AOO talks about the performance, the duo emphasises their dual motivation in undertaking the project. Firstly, their long-term involvement in environmental and ecological issues in general and in the technoscientific manipulation of nonhuman species and their extinction in particular, inspired Laval-Jeantet and Mangin to pose the question of whether and how it is possible to think, visualise, and embody a situation where "the roles are reversed." By "reversal," they mean a change in the usual circumstances in which humans exploit and abuse nonhuman animals (whether for food, science, fashion, or entertainment). Instead, they wish to imagine, "embody," and present a case in which the human body becomes a fleshy host for the nonhuman animal presence – perhaps

¹²³ See, for example: Hannabach 2015; Hogan 2009; Dodds Pennock 2008; Sturm 2002; Lederer 2008; and Longinovic 2011.

even a shelter or preserve for another species. Such an idea has of course more to do with the realm of the cultural, scientific, and ethical imaginaries than with devising a potential remedy for nonhuman animal extinction. Secondly, AOO underlines their fascination with the question of the other, which could be traced to Laval-Jeantet's anthropological background. The artist asks whether, by embodying the nonhuman animal other, she can perhaps alter her perspective and experience that other through her flesh, from within. She equates the presence of equine plasma in her veins with the experience of otherness: becoming the other or being in touch with the other on a subdermal level. The other in this case is the Horse (not any particular horse, but probably several anonymous horses that were the origins of the blood from which the plasma used in AOO's project was extracted). However, the other is reduced to bodily substance: blood plasma. This other is not a subject and the artist's experience is focused only on her own psychological and somatic alterations. The reduction of the animal to a bioscientific product does not seem to differ much from the practices of exploitation of nonhuman bodies that AOO seeks to critique. In addition, Laval-Jeantet and Mangin see their piece as an attempt to challenge the issue of species boundaries and draw attention to the problematic and blurred nature of these boundaries. They believe that this piece, in which the human body is injected with equine immunoglobulins, but does not undergo anaphylactic shock (and, therefore, is shown to have adjusted to the presence of a foreign substance in its own system), demonstrates that the boundary between two species is more permeable and plastic than it is held to be in common understanding. The main actant in the project is not Laval-Jeantet as a subject or self-contained body (as AOO seems to suggest in their descriptions) but, rather, her body as a multiplicity of cells, tissues, and molecules that interact with one another and the properties of which are modified and shaped through these interactions. In this context, the non/living is not encapsulated in discrete bodies; instead, it appears as material forces expressed through the multiplicity of processes through which these different bodies (cells, tissues, immunoglobulins, etc.) become.

This chapter looks at how Deleuze and Guattari's conceptualisation of assemblages may allow for an examination of human/nonhuman relationality, the accompanying notion of the non/living, and the ways in which they are enacted through AOO's performance. In several interviews given in English, in which Laval-Jeantet speaks about *May the Horse Live in Me*, she uses the notions of "experiment" and "experience" interchangeably. This may be directly linked to the word *expérience*, which is the French translation of both "experience" and "experiment." However, this overlapping has further philosophical resonances. James Williams notes that it forms part of Deleuze's philosophy of difference. Deleuze writes: "There is a crucial experience of difference and a corresponding experiment: every time we find ourselves confronted or bound by a limitation or an opposition we should ask what such a situation presupposes" (Deleuze cited in Williams 2003, 76). As Williams explains,

When we experience difference by experimenting, Deleuze claims that experience becomes a radically multiple thing – that is, it is no longer the experience by a self of a set of objects. It is the temporary coming together of an infinite series of pure differences into areas of more and less clarity and obscurity, according to the experiment. (Williams 2003, 76)

In other words, he continues, in Deleuze, experience can be understood as "a temporary combination of differences," which allows us to go beyond an opposition of the fixed identities of the experiencer and the experienced (ibid.). Thus, Deleuze's understanding of the pair experience/experiment as something that is not defined through the identity of a subject parallels his and Guattari's formulation of affect as an impersonal, non-subjective intensity. Keeping this in mind, I analyse AOO's bioartistic experiment/experience, not by taking fixed bodies as my starting point but, instead, by focusing on the multiplicity of differences, intensities, and processes.

1.3. Between Critique and Affirmation

In my examination of AOO's performance presented in this chapter, I employ two forms of critical approach: a "paranoid reading" and a "reparative reading," as proposed and described by Eve Kosofsky Sedgwick "not as theoretical ideologies (and certainly not as stable personality types of critics), but as changing and heterogeneous relational stances" (2003, 128). In *Touching Feeling*, Sedgwick defines "paranoid reading" as a methodology and mode of analysis that relies on Paul Ricoeur's "hermeneutics of suspicion." Ricoeur applies his concept to the works of "three masters": Karl Marx, Friedrich Nietzsche, and Sigmund Freud, who (each in his own way) "look upon consciousness primarily as 'false' consciousness" (Ricoeur 1970, 33). To put it simply, according to Ricoeur, after Marx, Nietzsche, and Freud, we doubt not only the world (as Descartes did), but also consciousness itself. Thus, the hermeneutics of suspicion consist of not only the practice of critique, but also "the invention of an art of *interpreting*": "to seek meaning is no longer to spell out the consciousness of meaning, but to *decipher its expressions*" (ibid., 33; italics in the original). As Sedgwick argues, such an approach, relying on suspicion and questioning, and focused on "exposing and problematizing hidden violences" (2003, 139) is characteristic of New Historicism, deconstruction, feminist theory, and Marxist criticism. She positions this mode of analysis in the context of psychoanalytic theory and perceives it as characterised by "future-oriented vigilance" (Sedgwick 2003, 130). While paranoid reading primarily concentrates on critique and the unveiling of hidden oppression, violence, and pain, reparative reading consists of more affirmative modes of critique, the "*seeking of pleasure*" (ibid., 137; italics in the original), and opening oneself to the unexpected:

to a reparatively positioned reader, it can seem realistic and necessary to experience surprise. Because there can be terrible surprises, however, there can also be good ones. Hope, often a fracturing, even a traumatic thing to experience, is among the energies by which the reparatively positioned reader tries to organize the fragments and part-objects she encounters or creates. Because the reader has room to realize that the

future may be different from the present, it is also possible for her to entertain such profoundly painful, profoundly relieving, ethically crucial possibilities as that the past, in turn, could have happened differently from the way it actually did. (ibid., 146)

As Sedgwick argues, neither of these methodologies is better than the other: each of them involves a different set of possibilities and risks. Focusing exclusively on one of these modes of analysis – for example, privileging paranoid reading and entirely dismissing the reparative mode – may inhibit our critical practice and prevent us from recognising potentials for change.

Sedgwick's description of these two approaches is partly inspired by Silvan Tomkins' affect theory, which understands affect as emotion or personal feeling and, thus, differs substantially from the concept of affect employed in this thesis, as I have argued in Chapter One. However, the analytical distinction between the paranoid and the reparative reading as two epistemological stances, methodologies, and forms of interpretation, sheds light on the equivocal character of AOO's performance. When employed as a heuristic device in the analysis of artworks, Sedgwick's distinction helps me to extricate and examine the different, intertwined dimensions of the project. In other words, it contributes to my use of both critical and affirmative modes of analysis, each of which has its own purpose. More specifically, the paranoid reading practice allows me to focus on a dialogue between art, science, and philosophy, and particularly on their joint enterprise: a critique of anthropocentrism. It is also this same critical lens that enables a vibrant and meticulous analysis of the artists' discourse about their work, which, as I shall show in my first paranoid reading, often reconfirms rather than criticises essentialising and anthropomorphising conceptualisations. Simultaneously, the reparative mode of reading (which I prefer to call "affirmative," following the tradition of a Deleuzian feminist emphasis on "affirmative critique")¹²⁴ opens up a space for the potentials carried by the artwork itself and for a critical–creative analysis of the performance. In this way,

¹²⁴ See e.g.: Braidotti 2011.

the two modes of critique enable a more nuanced and attentive examination of both *May the Horse Live in Me* and the discourse accompanying the project.

1.4. Transspecies Embodiments

It would be difficult to deny that AOO's performance is a brute incorporation of the animal body in the form of blood, which inscribes itself in the history of cultural and technoscientific exploitation of nonhuman animal flesh. Simultaneously, as an artistic experiment (and, thus, as an undertaking that aims to raise questions and create affects rather than give concrete answers), the project requires an attentive consideration of both its potential to encourage a rethinking of species boundaries and the body as a multiplicity, and the ways in which it forms part of the cultural and scientific mechanisms of nonhuman exploitation by humans. It is this tension of *May the Horse Live in Me* that makes the project a compelling foundation for a re-examination of both human/nonhuman relations and the non/living, as well as their place in contemporary cultural-scientific imaginaries.

In the performance, the artist's body is presented as a transspecies embodiment. What is exposed through this is in fact the inherent multiplicity of human and nonhuman embodiments. They are always already transspecies assemblages. As I mentioned in the Introduction, our bodies are hosts for numerous microorganisms, without which we would not be able to survive. Furthermore, recent studies have shown that humans carry in their DNA as many as 145 genes from other species (bacteria, other single-celled organisms, and viruses) as a result of horizontal gene transfers (Crisp, et al. 2015).¹²⁵ Thus, the presence of equine molecules in Laval-Jeantet's body is not necessarily an entirely

¹²⁵ Horizontal gene transfer (HGT), also known as lateral gene transfer (LGT), is a mechanism by which genes are transferred from one organism to another in a manner other than sexual or asexual reproduction. In other words, in HGT, genes may be transferred between different contemporaneous species. Until recently, HGT was thought to occur only in microorganisms. However, the study by Crisp, et al. (2015) shows that HGT is a widespread mechanism in animal evolution and, thus, also occurs in complex organisms, including humans.

different form of human/nonhuman interaction. Rather, the performance works as a magnifying glass that renders this transspecies multiplicity (more) visible and in this way challenges cultural narratives about the autonomy of the human subject and the individual and containable character of life.

As AOO's performance brings together the mechanisms of exploitation and the potential for critique, I approach this project as an "imploded knot," which Haraway defines in the following way: "[imploded knots] lead out into worlds, you can explode them, you can untangle them, you can somehow loosen them up. They are densities that can be loosened, that can be pulled out, that can be exploded, and they lead to whole worlds, to universes without stopping points, without ends" (2003b, 338). *May the Horse Live in Me* contains a number of threads that may be loosened and untangled: as well as being a bioartistic experiment that both reinscribes itself in the structures of oppression of nonhumans by humans and simultaneously draws attention to transspecies relationality, the project is also deeply invested in the history of immunology and vaccination, and the ways in which human/horse relations have been figured in cultural imaginaries. In the subsequent sections I employ both the paranoid and the affirmative reading; I tease out the structures of oppression of nonhumans by humans through the paranoid reading (in sections 2.1 and 2.2), and draw attention to transgressive transspecies relationality (in section 2.3). In other words, I follow each of these threads in order to examine how AOO's performance may serve as a springboard for a biophilosophical analysis of both human/nonhuman relationality and the non/living.

2. Human/Nonhuman Assemblages

2.1. Bodies of Matter

Looking at *May the Horse Live in Me* as an assemblage allows us to understand and acknowledge both the complexity and the essential nature of relationality: the characteristics, qualities, patterns of behaviour, and

ways in which micro (e.g. immunoglobulins) and macro (e.g. the artist's) bodies affect one another and materialise through the realisation of the project. The material and discursive setup of the performance hypostatizes both the human and nonhuman elements and ongoing processes. The audience is not neutrally separated from the event; on the contrary, it forms part of the machinery through which the bodies of matter and bodies of meaning are constituted and continuously transformed and reconfigured. In the performance, both the human and the nonhuman are mutable and dynamic, but in different ways. The artist takes charge of the experiment: she makes decisions and acts in specific ways; yet, the micro-bodies of her immunological system and her other cells and tissues behave independently of Laval-Jeantet's will and control. In the subdermal encounter, the nonhuman is reduced to the equine immunoglobulins extracted from horse blood used in immunological research. Yet, these nonhuman proteins are not static: they interact with the antibodies produced by the artist's body and, thus, have a direct impact on her body's state.

2.1.1. Preparation of the Project

The performance as such is simultaneously linked to a series of assemblages – one of which is the eight-year-long process of preparation for *May the Horse Live in Me*. The inception of the project may be traced back to the exhibition *Art Biotech* (2003) at Lieu Unique in Nantes, France, curated by Jens Hauser, in which AOO participated, and at which the discussion about animal objectification and exploitation by technoscience and culture arose. It is at this exhibit that Laval-Jeantet and Mangin began to ponder the idea of the symbolic (yet enfleshed)¹²⁶ reversal of roles: providing a human body as an object and place for the nonhuman (animal) to reside, and the possibility of visualising such a

¹²⁶ I use the word “enflesh” and not “embody” in order to emphasise the multiplicitous and non-subjective character of biological matter. Whereas the notion of the body implies certain frames and the idea of a bounded entity, “flesh” refers to biological materiality of compounds, cells, and tissues that are not necessarily ascribed to a particular subject or contained within prescribed boundaries.

reversal. There were other factors at the time that inspired Laval-Jeantet to think not only about the possibilities of lending one's body as a form of dwelling for the nonhuman, but also about making it (symbolically) a "safe" place and a form of survival for an extinct or endangered nonhuman animal species. As one of the inspirations behind her interest in "reviving" (even if only in symbolic terms) endangered or extinct species, Laval-Jeantet mentions her trips to Angola in 2004. The national symbol is the giant sable antelope (*palanca negra gigante* in Portuguese). At that time, the Angolan government was desperately searching for any remaining specimens of this critically endangered species. A team of researchers led by Dr Pedro Vaz Pinto provided photographic evidence of a herd located in Candangala National Park.¹²⁷ The story of *palanca negra gigante*, an animal "still considered a symbol of a surviving nation when it had not itself survived" (Laval-Jeantet and Mangin 2012, 248), as Laval-Jeantet puts it, made her think about using her own body as a place where an endangered species could survive.

In order to delve into the question of human/nonhuman relationality, I will first address the different threads that are woven together in the project *May the Horse Live in Me*, while looking at the multiplicity of components present in the becoming of the project. L'Art Orienté Objet was formed by Laval-Jeantet and Mangin in 1991. Laval-Jeantet's background is in science, art, ethnology, clinical psychology, and ethnopsychiatry. Mangin studied scenography, theatre, literature, and art history.¹²⁸ As I have already mentioned, before they began their collaboration, the artists had been involved with activist groups addressing environmental and ecological issues. This has shaped their interests and aims, one of which is to investigate "the manipulation of the living, the vegetal, the animal and the human, by society and science" (We Make Money Not Art 2007, n.p.). This also explains their focus on issues related to biotechnology, animal experimentation (linked to laboratory procedures), and nonhuman animal exploitation in the

¹²⁷ See: Angola Field Group 2009.

¹²⁸ See an interview with Laval-Jeantet: We Make Money Not Art 2007, and Laval-Jeantet and Mangin 2012.

contemporary world in general.¹²⁹ AOO emphasises two aspects of their artistic practice: firstly, their works often involve procedures of recycling – a broadly understood recycling of ideas and thoughts as materials (Verbeke Gallery n.d.), and, secondly, as artists and researchers, they are focused on the previously mentioned question of experience. Thus, for them, the process of creating art is indistinguishable from conducting research, teaching, and activism.

They explain that the conversations and discussions that took place during the exhibition at Lieu Unique in 2003 made them wonder whether, or rather how, they could visualise and en flesh an act in which the human body becomes a host for a nonhuman animal, even a shelter, which could serve as a symbolic gesture reversing the predatory character of humans, as mentioned above. In this case, the reversal was formulated as a sort of blood transfusion, or injecting Laval-Jeantet with nonhuman blood. However, the animal that AOO had in mind at the time was not the horse; rather, the idea was to create a fleshy form of safe space for (and preservation of) an endangered species: the panda. Although the artists do not explain in detail their motivation behind the choice of the panda over other species facing extinction, one can see that the figure of the panda is iconic in discourses around extinction: it is the symbol of the World Wildlife Fund for Nature (WWF)¹³⁰ on the one hand, and a cute, unique, rare species of bear living only in central China, on the other.

Tracing the stages of the project from the initial concept through to obtaining the Golden Nica Prize for Hybrid Arts at the Ars Electronica Festival in 2011 allows one to consider how the artists' ideas evolved and the impact that this had on the ways in which each of the elements took shape in the final project. While pursuing the idea of *May the Panda Live*

¹²⁹ Several of AOO's earlier projects include, for example: *Artists' Skin Culture* (1996), *Rabbits Were Used To Prove* (1999), *The Museum of Natural Horrors* (1997), *The Museum Of Human Horrors* (1999), *The Museum of Mental Horrors* (2001), *Pioneer Ark* (2001), and *Roadkills' Coat* (2000) (see: Art Orienté Objet n.d.). With these projects in mind, one can see the continuity of AOO's interest in both scientific and artistic practices, in addition to their ethico-political investigations. See also: Verbeke Gallery n.d.

¹³⁰ See: World Wildlife Fund 2016.

in Me, Laval-Jeantet and Mangin enquired at a number of zoos and laboratories about obtaining samples of panda blood and conducting an experiment involving transspecies blood transfusion. None of the zoos, reserves, or laboratories contacted was willing to give the artists access to samples of blood taken from their pandas, given that they are an endangered and protected species. AOO realised that being entirely open about their aim and intentions was perhaps not the best way to pursue their enquiries. After months of researching different possibilities, Laval-Jeantet and Mangin found a research centre in Switzerland (and, thus, not subject to EU and European legal regulations) that has been investigating the application of animal blood for curative purposes, mainly related to autoimmune diseases. They agreed to allow Laval-Jeantet to use their facilities and equipment. According to her, having learned from past experience, she did not present herself as an artist. Officially, her motivation to work at the centre, and consequently the main reason why she was accepted, was stated in her proposal as advancing a neuropsychological research project aiming to investigate the impact of animal blood on the neuroendocrine system, which was also consistent with her training and qualifications.¹³¹ The laboratory was specifically interested in the impact of animal immunoglobulins on the human neuroendocrine system. Yet, Laval-Jeantet notes, the staff at the lab regarded the injection of several types of animal immunoglobulins into the human body as simply dangerous. There are many factors potentially impeding the design of experimental protocols that could be used in this type of research. Among these are: questions concerning the amount of foreign immunoglobulins that cause anaphylactic shock, and the correlation between conducting this kind of experiment and the appearance of autoimmune disease. For this reason, the artist decided to plan every detail of the experiment herself.

The centre offered Laval-Jeantet four options for the type of nonhuman animal blood that could be employed in the research: cows, pigs, sheep, or horses. She decided to choose the horse for several reasons

¹³¹ See: Laval-Jeantet and Mangin 2012, 251–258.

that do not have much to do with the scientific side of the project. Firstly, she claims, there are a number of stories about horses and human/horse unions in mythology across different cultures and traditions, with the Ancient Greek figure of the centaur being the most widely known in the Western context. This aspect closely links the project to the cultural imaginaries surrounding human/nonhuman animal unions in general and human/horse in particular. Secondly, because Laval-Jeantet is of small stature, she mentions the horse's size as "more attractively foreign" (Laval-Jeantet and Mangin 2012, 256) to her and, thus, more interesting when contrasted with her own body size. Furthermore, she also admits that she has always been afraid of horses and, as a result, unfamiliar with them. Although, in her narrative, Laval-Jeantet does not link this fear with the feelings she experienced after the performance, it is worth considering the possibility that the meaning she ascribes to her anxiety and restlessness might be linked to her interaction with the Horse on both the micro (through the injection of equine plasma) and macro (by meeting with Viny) levels.

Prior to beginning their practical work at the Swiss laboratory, the artists also made a study visit to the Biopole Institute in Poitiers, France, where they learnt about the details of how human and horse blood cells behave. There is a substantial difference in the size of the cells. As mentioned, before the blood taken from one animal species is inserted into another species' circulatory system, it has to be "cleansed," which means that every element except the plasma, hormones, lipids, and certain proteins has to be removed. Laval-Jeantet notes that when they observed the mixing of unprocessed horse and human blood in vitro through the microscope, what they saw was a battle between the cells "with no survivors on either side" (ibid., 255). Her narrative is culturally infused by discourses on battle and war: the artist maps the language of the battlefield onto the interaction of human and equine molecules and cells observed under the microscope. Such language, imbued with military metaphors that present relations between cells as a battlefield, is common to western medicine in general and to the field of immunology in particular. For example, A. David Napier (2010) argues that

“contemporary attitudes about transformation and change are articulated in the theory and practice of virology and immunology” (2010, 2). As he shows, this relation between immunology and culture unfolds in two directions: general cultural attitudes towards difference and the other are frequently described in medical metaphors (“contagion,” “epidemic,” and “virus” have been used historically in much the same way as they are employed in the contemporary discussions on terrorism), while immunological processes are framed through military metaphors (usually in terms of a “battle” between self and not-self, “invasion,” and “defence”). What he sees as particularly problematic about the use of military language in immunology is the (detrimental) cultural implications of the idea that there is a “*system* to eliminate not-self” (ibid., 42):¹³² the military-imbued notion of the immunological system has influenced cultural and political discourses on the other (in the broadest sense).¹³³ In her work, Haraway repeatedly reminds us about the power of metaphors: they are “material-semiotic actors” that take part in knowledge production (Haraway 1992). As she emphasises, “It matters what matters we use to think other matters with; it matters what stories we tell to tell other stories with; ... It matters what stories make worlds, what worlds make stories” (Haraway 2013, n.p.). In this context, the framing of the interaction between the equine and human elements of blood through the notion of a battle implicitly introduces ideas of discreteness, incompatibility, and hostility not only between cells and molecules, but also between species. Thus, despite AOO’s claims that

¹³² Another consequence of such language that Napier sees as problematic is the attribution of intentionality to viruses: “left to itself, a virus ... cannot grow, it cannot move, it cannot reproduce, and it has no power unto itself. If viruses are thus understood, why do we talk about them as if they are volitional and intentional beings? Why do we say that they appropriate, mask, invade, deceive, enslave, destroy, and reproduce?” (2010, 42).

¹³³ Note, for example, the use of the term “war” in relation to the HIV virus in the slogan “the war on HIV/AIDS” (among other demonising metaphors, like “horror”). As Peter Aggleton (2000, 10) argues, “these metaphors constitute a series of ‘ready-made’ but highly inaccurate explanations that provide a powerful basis for both stigmatizing and discriminatory responses. These stereotypes also enable some people to deny that they personally are likely to be infected or affected.”

they wish in their art to focus on the connection between human and nonhuman animals, they also implicitly rely on notions of the separateness and self-containability of human and nonhuman bodies.

During her three months at the Swiss laboratory, Laval-Jeantet tested the reaction of her body to various groups of equine immunoglobulins. Every week she injected herself with a different group of immunoglobulins and observed how her body reacted. Her aim was to stimulate her blood system to adjust and generate enough antibodies in response to exposure to the horse blood plasma so that her body would be able to eliminate as many foreign immunoglobulins as possible during the performance itself. In this way, the immunoglobulins that were not eliminated would “interact with the targeted organs, producing the hoped for effects” (ibid, 257). Interestingly, in interviews and texts about the project, the artist does not describe in detail her bodily reactions to these weekly injections. Instead, she emphasises that the three months of “adjusting” her body to the new conditions proved to be successful: the dreaded anaphylactic shock did not take place when she received her “immunoglobulin cocktail” during the performance. It is also significant to note that finding a suitable location for the performance was not easy. Since it was a form of medical experiment, it required the presence of an emergency unit and most venues were not eager to host an event that involved such safety measures.

2.1.2. Laval-Jeantet’s Reflection on Her Experiences Following the Performance

As Laval-Jeantet later describes her experiences following the performance, she could feel the impact of the horse blood plasma injection for two weeks following the event. The first eight days were particularly difficult, as mentioned above, as the problems with sleep, sudden mood swings between fear and anxiety, the feeling of powerfulness, and an insatiable appetite combined with the inability to digest food, completely exhausted her body. It is not clear whether any additional consequences of the experiment may occur in the future. When the artist talks about how she felt during those two weeks, she tends to

ascribe labels: “horse-like” and “primate-like,” to certain types of experience. The rapid shifting between feeling frightened and powerful is described by her as “for sure ... a horse thing” and not characteristic of a primate (ibid., 255). After these tense eight days, she notes that she experienced a sudden collapse from overwhelming fatigue that lasted a month. She explains that the presence of foreign immunoglobulins in her body triggered inflammation and unusual responses in her organs; for example, a significantly higher metabolic rate resulting from the acceleration of thyroid gland activity (Ars Electronica 2011). The artist seems to be aware of the immunological explanations for her physiological reactions; yet, at the same time, she reifies these processes and ascribes to them fixed, opaque, and discrete identities: the human and the horse.

Laval-Jeantet emphasises that the project and the experience she has gained from it enabled her to understand and accept fear as part of “a fuller understanding of the world” (ibid., 268). She explains that the sudden feelings of fear were one type of (unusual for her) psychological reaction that she experienced after the performance. Laval-Jeantet describes the project as a modifier of her perception, sensitivity, and consciousness, a way for the presence of a nonhuman animal other in her body to expand and influence these three aspects. Whereas it is true that the injected foreign immunoglobulins had an impact on the artist’s neuroendocrinological system and, thus, on the related functions, her descriptions are imbued with anthropomorphisations (of the behaviour of both cells and molecules, and nonhuman species) and heavily influenced by legends and mythological and anthropological stories about human/nonhuman relations, which she also regards – as mentioned earlier – as an incentive for her choice of the horse.

Furthermore, the artist underlines that, for her, the aim of the effort that she undertook to realise the performance was “to examine the human body’s reactions, the limits of its adaptation, and most importantly, the extent that physiology affects the mental state” (ibid., 258). This is an interesting moment in her explanation of the project, since the goal described in this way does not converge with the primary motivation

mentioned earlier. The initial interest *in meeting* the other seems to have been modified into an interest *in the effects* that this encounter has *on the human body*. From a posthumanist perspective, we could say that Laval-Jeantet's emphasis on the close interrelatedness between consciousness and flesh – “an embodiment of meaning” (ibid., 268), as she calls it – can be seen as an effort to think about the body and artistic practices as interrelated elements, and, thus, to go beyond the dualism of meaning and matter. The artists focus on the processes and reactions that take place between human blood and equine immunoglobulins when they experiment with the ingredients *in vitro* in order to examine the biochemical stages of these reactions with the experts. Yet, there are dimensions of the project that are either downplayed by AOO, or simply ignored. These dimensions – when read through a Deleuzian lens – could further challenge traditional Western ideas about the discrete and contained character of the body, the boundary between the human and nonhuman, and the relation between the two. I will now take a look at these dimensions of the project, which can be seen in terms of two interconnected issues: human/horse relations in the history of medicine and the reduction and anthropomorphisation of the nonhuman.

2.2. Human/Nonhuman Relations and the History of Medicine

Laval-Jeantet and Mangin explain their motivation for realising the art piece in numerous interviews. As explained earlier, their driving force was twofold: on the one hand, it is the idea of meeting the (nonhuman) other at the under-the-skin level; on the other hand, it is an attempt to reverse the traditional Western concept of the relation between the human and nonhuman (in which it has always been the human who has abused the nonhuman animal). They also signal the wish to address cultural imaginaries by evoking mythologies: Balinese, Siberian, and, more familiar to the West, Greek stories about human–horse hybrids and communication. Simultaneously, AOO consider the technical aspects of the reaction between human and horse cells and substances. Yet, what they seem to miss is the multiplicity of ways in which their own experiment is situated within a set of assemblages: the presence of horses,

and the history of human/horse relations, in the context of medicine, which can be seen as crucial factors indirectly impacting upon the project. Laval-Jeantet at once introduces the name of German physiologist Emil von Behring, who conducted research on the use of animal serums in human medicine and received the Nobel Prize in Physiology for the discovery of diphtheria antitoxin in 1901, but fails to elaborate on his influence on the project itself, merely concluding that experimenting with the use of animal blood derivatives in humans *in vivo* became less popular as human immunology progressed (ibid., 251). Such a statement does not do justice to the research in this area, though. Antitoxins are immunoglobulins (or, in other words, antibodies) that are able to neutralise toxins and kill specific microorganisms. They are obtained from bacteria, plants, and animals. In the latter case, an animal is injected with a minimum dose of a particular toxin: safe for the animal and enough to generate an immune response. This response consists of the production of antibodies that are capable of fighting the toxin. Once the animal's body has produced the antibodies, its blood is collected. Subsequently, the blood is cleansed and processed so that the antitoxin can be extracted from it and injected into a human or nonhuman animal organism in order to trigger a passive form of immunity.¹³⁴

2.2.1. Human/Horse Relations: a History

At the end of the nineteenth century, the H.K. Mulford Company of Philadelphia, USA, developed the production of diphtheria antitoxin obtained from horse-blood serum. In 1901, the issue of antitoxin production became a matter of public discussion and triggered the

¹³⁴ In short, passive immunity is a form of humoral immunity, that is, it involves the substances and particles found in bodily fluids (mainly antibodies) and thus is different from cellular immunity (which involves the activation of phagocytes and T-lymphocytes). Passive immunity consists of the transfer of antibodies between one organism and another. It takes two forms: 1) naturally acquired (i.e. achieved by the transfer of antibodies from the mother to the foetus through the placenta); and 2) artificially acquired (when large amounts of antibodies specific to a certain toxin or pathogen are injected into a non-immune organism with the aim of inducing immunity). See: Janeway, et al. 2001; Dart 2004.

development of drug safety policies in the United States, as one of the horses whose blood was used contracted tetanus and was euthanised.¹³⁵ Only after the death of a girl in St. Louis did it emerge that bottles filled with the contaminated antitoxin (produced from the infected horse's blood) had been used in the treatment of diphtheria in child patients. The contaminated antiserum caused the deaths of thirteen children.¹³⁶ Jim, the horse that fell victim to tetanus, and whose death was followed by the deaths of human patients, was a retired milk workhorse that, during his service (or slavery) to human medicine, produced thirty quarts of antitoxin within a period of three years.¹³⁷ He is associated with the beginning of the legal regulation of vaccine and antitoxin production in the United States. Although many things have changed since 1902 when the law was introduced, horses (along with other animals: sheep, rabbits, and goats) are still used in the production of antivenoms and antitoxins. According to the list of immunoglobulins approved by the U.S. Food and Drug Administration (FDA) for use in the treatment (and prophylaxis) of infectious diseases in the United States, horses are still the source of antitoxins employed to fight diphtheria and botulism in children and adults (Baron 1996). It is important to note that nonhuman animal-derived antisera are not always well tolerated by humans. Antivenoms and antitoxins may cause hypersensitivity reactions: either immediate, in the form of anaphylactic shock, or delayed, in what is known as "serum sickness." Despite the fact that a skin test can be carried out in order to estimate a patient's reaction to an antivenom, it is impossible to predict the actual risk of the patient being hypersensitive. Humans with high risk levels may not experience any allergic reaction, whereas those who have successfully undergone skin tests may develop one (Dart 2004, 254). The characteristics of both the substances contained in an antiserum and the anatomy and physiology of the immune system are known to immunologists who apply antivenoms or antitoxins to their patients. However, these characteristics are not necessarily fixed: they

¹³⁵ See: Lilienfield 2008.

¹³⁶ See: U.S. Food and Drug Administration 2009.

¹³⁷ See: Bren 2006.

meaningfully materialise only in the intra-action between them.¹³⁸ This is also why tests in the case of patients treated for envenomation have the status of a prediction and not of a guarantee. In a similar way, Laval-Jeantet put herself under the aforementioned training regime in order to adjust her immune system's reaction to foreign antibodies, however unpredictable the chances of success might have been. This unpredictability of the reaction between the cells and molecules originating from different species indicates the uncontainability of the non/living: by entering different assemblages (for example, encountering cells of another species), cells and molecules engage in diverse processes, express their properties, and behave differently. In other words, they become through their intra-actions with one another and do not have a fixed and immutable identity policed by human ideas and actions.

Jim's story and the production of antitoxins and antivenoms are not the only instances of the human/horse relationship in the history of biomedicine. Other examples are the treatment of tonsillitis, scarlet fever, toxic shock syndrome (in humans), and strangles (in horses). Both human and horse diseases are caused by bacteria of the same family, *Streptococcus*: *Streptococcus pyogenes* (tonsillitis in humans) and *Streptococcus equi* (strangles in horses). As the researchers who investigate both strains of the *Streptococcus* bacteria note, the horse version of the bacterium (*S. equi*) is able to trade genes with the human version (*S. pyogenes*), which is one of the reasons why strangles has been so difficult to fight.¹³⁹ Furthermore, both strains are able to generate "superantigens" that confuse the immune system of the infected organism, preventing the bacteria from being detected by the host's body. Another common characteristic of *Streptococcus* is its ability to produce a toxin called SlaA, which is related to the venom of the Australian brown snake that is linked to severe diseases in humans (e.g. kidney damage).¹⁴⁰

¹³⁸ Here, I employ the notion of intra-action (and not interaction) in order to emphasise that the properties of different elements are shaped through the processes of intra-acting between these elements; they are not fixed and stable prior to the intra-action.

¹³⁹ MedicalXpress 2011.

¹⁴⁰ See: MedicalXpress 2011; Clinical Toxicology Resources 2003.

It appears to be impossible to investigate the two strains of microbes separately. As the researchers claim, looking at the genetic evolution of *S. equi* may allow them to understand the evolution, characteristics, behaviour, and possible future changes of *S. pyogenes* (Waller, et al. 2011). Consequently, work on the development of a vaccine against strangles may help to advance the research on a potential vaccine against *S. pyogenes*.¹⁴¹ Thus, the past, present, and future of both species of bacterium are enmeshed with one another in just the same way as the human and horse are in the context of immunology. Against this background, AOO's experiment does not seem to be suspended in a vacuum but, instead, forms part of a larger transspecies assemblage in its historical, cultural, and scientific aspects.

Another factor that is elided in AOO's comments on the project is the agentiality of the micro-bodies involved in the procedure on the one hand, and the figure of the blood donor(s), on the other. The horses whose blood is used in immunological research are cogs in the biomedical machine. In the context of *May the Horse Live in Me* – if we do not count the representative role of Viny – their materiality is reduced to the processed blood plasma. It is the plasma that stands for the animal in this transspecies encounter and, thus, replaces one of the subjects in the meeting. The donor horse, the actual nonhuman animal other that Laval-Jeantet sought to meet on a sub-dermal level, is replaced twice in the artists' narrative: firstly, by the injection of horse immunoglobulins (horse blood plasma stands for the donor horse from which it was extracted, while s/he is absent), and, secondly, by the presence of Viny, the actual horse who plays the representative role of The Horse, intended to remind the audience about the origin of the animal proteins involved in the experiment. Immunoglobulins are presented by AOO as the cause of Laval-Jeantet's bodily states following the experiment – in their narrative the particles' characteristics are fixed and anthropomorphised: they are others and invaders that induce in the artist's body a "horse-like"

¹⁴¹ Researchers have been working on a vaccine against *S. pyogenes* for decades. Despite some success (Guilherme, et al. 2013), there are still no vaccines available (Good, Batzloff and Pandley 2013).

behaviour. Describing proteins and other elements involved in the immunological reaction of the human body that took place at the event in this way does not prove to be fruitful. It appears that AOO enters the experiment with a predetermined scenario and established rules that they project onto the processes that take place before, during, and after the performance: as emphasised above, in the sub-dermal encounter, the horse is reduced to a sterile form of immunoglobulins that affect Laval-Jeantet's body (they interact with her immune and neuroendocrinological systems and, thus, are not inert); yet, it is only the artist's body that is the subject and centre of attention in the performance. Although Laval-Jeantet meets Viny in the gallery space, he only symbolises or represents The Horse with which her own cells intra-act and interact. In this way, the nonhuman partner in the encounter that is central to the piece (i.e. the encounter taking place under the artist's skin) is reduced to the tamed form of the selected immunoglobulins. AOO does not ask or speak about what happens to the donor horse (this horse is practically absent in their narrative); nor do they concentrate on the behaviour of equine immunoglobulins as such. The main and only focus is the reactions and experiences of Laval-Jeantet's body.

May the Horse Live in Me reveals several important aspects concerning human/nonhuman animal relations and their place in the field of bioart: firstly, the project is entwined in a temporal and material sense with the history of the use of horses in biomedicine. Knowledge production in both human and veterinary medicine might have taken a different shape had the two species been considered completely distinct from one another. The employment of nonhuman animals in human medicine and bioscience (especially as animal models) in a broad sense relies on a paradox which, on the one hand, sets nonhuman animals as living simulators of human bodily functions (and thus close enough to replace the human body in e.g. medical tests), and, on the other hand, views them as distant enough to be exploited in the name of the progress of science and technology. AOO's performance builds on the results of immunological research, while refiguring the standard experimental procedures in a playful, artistic frame by pushing the limits of what is

deemed standard research practice. Laval-Jeantet and Mangin often emphasise the importance of artistic and personal freedom and see the project as part of such a pursuit. However, its realisation is conducted through a series of adjustments and constant negotiations with legal, biomedical, and cultural frameworks.¹⁴² AOO's narrative and practice are closely entwined with cultural imaginaries: the stories of centaurs' strength and horse-human unions haunt Laval-Jeantet's descriptions of her own experiences both during and after the performance.

2.2.2. Cultural Meanings of Blood

The project is also linked to the cultural meanings of blood, which is seen as a key element in narratives of kinship and intimacy.¹⁴³ As Frances Bartkowski observes, referring to primatologist Frans de Waal, these are the stories of "the natural made cultural, or 'cultural naturals,'" and they delineate "who may be related to whom," for whom one should care, and who is considered an "intruder" (2008, 10–11). Because the idea that blood and consanguinity are classic notions representing the bonds of kinship, and because the twentieth and twenty-first-century biosciences and technologies have deeply shaken and reconfigured the notion of kinship in general, this issue is addressed critically by many feminist theorists. As Bartkowski writes, "Those old codes of blood are displaced and replaced in the twenty-first century by newly legible bodily fluids and solids. The policing, storing, matching, and trading in such substances prescribes anew our relations with those we consider intimates and those who remain outsiders" (Bartkowski 2008, 139). Contemporary

¹⁴² Interestingly, when asked at the Ars Electronics Prix Forum about the role of curators and institutions in her bioart practice, Laval-Jeantet responded that, even if there had been no support from institutions, she would have conducted the project for the sake of her own experience and knowledge. This statement is striking, since the documentation of the project describes in detail the difficulties that AOO encountered during the period of more than seven years of research and preparations, and the support they have received from Kapelica Gallery.

¹⁴³ The question of kinship and its link to blood opens up another vast and separate area of enquiry, which I cannot tackle here; that is, the idea of blood as a mechanism of exclusion and racism (e.g. thanatopolitics, eugenics, miscegenation, purity discourses, etc.).

science and technologies (such as IVF or organ transplantation) refigure kinship as conveyed through DNA, which is – at least when observed with the naked eye – less spectacular than blood. One of the most important voices in this critique is Donna Haraway's, whose work, from the *Cyborg Manifesto* (1991) and *Primate Visions* (1989) to her more current writings on companion species (Haraway 2003a; 2008), has questioned and remapped the concept of kinship. It is no longer seen as reserved primarily for humans and manifested in the bonds of blood. Human and nonhuman organisms are interconnected through the chemistry of the molecules and compounds that build our bodies, which unfolds in nonlinear ways. In the context of dog/human companionship, Haraway argues for the idea of "joint mundane creaturely kinship" (2008, 245) expressed through the practices of "becoming-with" each other. In other words, organisms of different species do not possess fixed characteristics and behaviours: instead, they become and are transformed through their relations with others. This feminist perspective, which redefines kinship in the light of both interspecies relationality and contemporary science and technology, sheds light on two aspects of being that AOO's discourse seems to overlook: firstly, blood is not a transmitter of essence (of horseness or humanness), nor is it the currency of kinship; and, secondly, human and nonhuman micro- and macro-bodies express their properties and are subject to change through their relations with one another (and therefore, they are not fixed, discrete, and autonomous entities).

2.3. Bodily Assemblages

As I have shown throughout this chapter, AOO's project cannot be fully understood without taking into consideration the relationships between this particular artistic practice and other components of the assemblage of human/horse relationality: immunology, the history of biomedicine, and cultural imaginaries. To reiterate the paranoid reading of AOO's project, the performance does not render the human/horse encounter more equal; it is not emancipatory for the nonhuman; and finally, it is invested in the practices of exploiting nonhuman animals. Yet, at the same time,

from the point of view of an affirmative reading, the project works as a magnifying glass: it exposes the entwinement of human/nonhuman and the power differentials that are inscribed in human/nonhuman relations.

Although Laval-Jeantet and Mangin stand by their descriptions of immunological and physiological processes in terms of typical “human” and “horse” features, *May the Horse Live in Me* challenges cultural and popular-scientific beliefs concerning both the containment of the body and the discreteness of species. As the preparations, performance, and outcomes show (given that to a great extent Laval-Jeantet was able to tolerate the injections of horse plasma), human and equine embodiments are not so very distant from one another. During the performance, the bodily substances of human and nonhuman kind enter “transi-stasis.” The notion of transi-stasis, as employed by AOO, refers to a state of the body in which its functions and parameters are not optimal according to popular-scientific ideas of the desirable condition (i.e. the body is not in the state of “homeostasis”).¹⁴⁴ Laval-Jeantet and Mangin describe it as a state characterised by continual “transformation and adaptation” – a state of constantly ongoing intra-actions of various elements: human and equine molecules, cells, tissues, and organs in the artist’s body. It is through these modulations and workings of immunological memory¹⁴⁵ that the qualities of human and horse blood elements materialise in their specific ways: had any factors in the experiment been changed – the practices of mithridatism,¹⁴⁶ the amount of immunoglobulins in each injection, or the schedule of injections – the features and behaviours of the human and equine cells might have emerged and hypostatized differently.

¹⁴⁴ See: Biofaction KG 2011.

¹⁴⁵ Immunological memory forms the basis of the adaptive immunological system. Once the infected organism eliminates an antigen, most of the lymphocytes generated to fight the infection undergo apoptosis. However, some of these cells remain in the system as “memory cells,” enabling a more rapid reaction against the same infectious agent in the future (see: Janeway Jr. 2001).

¹⁴⁶ Mithridatism is defined as “Immunity against the action of a poison produced by small and gradually increasing doses of the same” (MediLexicon International 2016, n.p.).

While the paranoid mode of reading helps us unpack and problematise the violence, oppression, and exploitation that subtend human/nonhuman relations and are incorporated into AOO's discourse about *May the Horse Live in Me*, it is the affirmative approach that mobilises an understanding of the human/nonhuman intertwinement in both the artistic (including the performance) and scientific contexts. The critique of anthropocentric ontologies of life and the offering of a non-anthropocentric alternative constitute one of the primary aims of this dissertation. This is also why a thorough engagement with the art projects and thinking them through also involves an analysis that is attentive to their contexts and the discourses surrounding them. Yet, along with the threads of the imploded knot of the performance that deal with the critique and problematisation of epistemological and material violence woven into bioscientific and bioartistic practices, it is worth also following the thread of the artist's body as the site, where the performance takes place *in vivo*.

According to the traditional categorisation of genres, which I problematise in the Introduction, *May the Horse Live in Me* is a hybrid form of body art and bioart. While I suggest that the project is situated along a spectrum of bioart–body art (rather than these being two separate categories), we should keep in mind one of the characteristic aspects of body art: the fact that art takes place on the body/in the flesh of an artist herself, often affecting her bodily boundaries, and thus creating a specific form of intimacy (as in the case already mentioned of Gina Pane and Marina Abramović). It is this issue of interfering in the flesh that creates sensations and intensities which influence and modify not only the artist, but also – in different ways – the audience. In the case of AOO's project, Laval-Jeantet's body (or rather, flesh) both constitutes the stage and becomes an actant in the performance of equine and human cells and molecules. As well as being an assemblage of these human and nonhuman substances, her body is also a place, where the physical processes and reactions triggered by the human/horse molecular performance (like inflammation and fever) intertwine with the artist's possible stress and feelings related to the procedure. The

hospital/laboratory-like setup involving multiple injections intensifies the idea of an unusual intervention in the body, which also draws the audience's attention. The project puts Laval-Jeantet's body into an unpredictable situation and reveals life as uncontrollable: although her body – as an assemblage altered through horse blood plasma injections – remains “under (medical) control,” both during and after the performance, there is no guarantee that there will be no ill effects whether in the form of short-term reactions or potential long-term changes in her immune system. Thus, *May the Horse Live in Me* is about experiencing “difference by experimenting,” as Williams (2003, 76) puts it. It is through experience/experiment that the boundary between the experiencer (e.g., the human) and the experienced (e.g. equine molecules) becomes blurred and, as a result, modifies the assemblage in often unexpected and indeterminate ways.

What the entwinement of horse and human fleshy matter in *May the Horse Live in Me* indicates is that entities are not monads with fixed, immutable essences. Instead, their features and qualities, as well as their boundaries, are modulated and transformed through their intra-actions with other components of the transspecies assemblage. AOO's performance helps us to understand the ways in which an ontology founded on the notion of the autonomous human subject may not be as valid as we might think. As previously mentioned, the artists do not explain what exactly happens with the horse immunoglobulins during the process, apart from the ways in which they interact with human cells. However, by showing that the human body can increasingly adjust to the presence of equine plasma and intra-act with its molecules, they challenge cultural ideas about the discrete, self-contained, and sovereign character of the body. Bodily boundaries are porous and “leaky,” as Margrit Shildrick (1997) suggests in her critique of the conventional understanding of the body. Similarly, classifications are not ultimate frames that fix bodies and their characteristics. Rather, bodily properties are expressed through the intra- and interactions with other entities that occur within a certain assemblage and may alter when the body enters a different assemblage. As Deleuze notes, “Bodies are not defined by their

genus or species, by their organs and functions, but by what they can do, by the affects of which they are capable – in passion as well as in action” (Deleuze and Parnet 2002, 60). This statement does not undermine the biological idea of classification but it does demonstrate that, in philosophical terms, the body refuses to remain contained within a classificatory box. Bodies are processual: they become with each other, forming alliances, relations, connections, and disagreements. Simultaneously, they are themselves assemblages of material components through which the non/living expresses itself. Bodily assemblages reveal the ways in which the material forces of the non/living interact and exceed the frames of distinct bodies and set definitions.

2.4. Concluding Remarks

The analysis of AOO’s project *May the Horse Live in Me* proposed in this chapter demonstrates the multiplicitous transspecies character of bodily assemblages. Furthermore, the interference between the analysed bioartwork, Deleuze and Guattari’s philosophy of assemblages, and bioscience exposes human and nonhuman bodies (that is, non/living assemblages) as expressions of uncontainable life. AOO’s performance – analysed with the help of Sedgwick’s dual lens – reveals the structures of anthropocentrism and mechanisms of exploitation of nonhumans by humans on the one hand, and draws attention to the transgressive potential of transspecies relationality on the other. The project brings to light the body as a multiplicity of organs, tissues, cells, and molecules that carry a capacity for entering new transspecies assemblages (Laval-Jeantet’s immune system adjusts to the presence of equine immunoglobulins and interacts with them). Deleuze and Guattari’s concept of assemblage sheds light on the ontology of bodies: they are always already multiplicitous and processual. Bioscience highlights human/nonhuman relationality in terms of both transspecies enmeshment constitutive of bodies (for example, our cells carry DNA from other species) and the use of nonhuman animals in the history of medicine. In other words, bioscientific insights underscore the blurriness and

permeability of species boundaries on the one hand, and the workings of anthropocentrism on the other. Thus, the interference between art, philosophy, and science creates the conditions for a more attentive, nuanced, and enriched understanding of the multiplicitous and excessive character of the non/living.

Chapter 4

Life: Uncontainability

1. Tinkering with Life

1.1. On Caring and Killing

30 January 2013: Day 3 of the “Biotech for Artists Workshop” organised at the Biofilia Laboratory in Helsinki in cooperation with SymbioticA. After dealing with DNA extraction and the genetic transformation of *E. coli* bacteria during the previous days of the workshop, we participants, led by Oron Catts and Marika Hellman, are facing the procedure of mammalian tissue engineering. This afternoon they show us how mouse skeletal muscle tissue – tiny cells practically invisible to the naked eye, floating in a nutritious pink-coloured medium¹⁴⁷ – is cleaned, fed, and reseeded. This means that the cultured cells are transferred to new flasks filled with fresh medium when the amount/density of the cells in a flask reaches 70–80% confluency.¹⁴⁸ The pink medium contains nutrients and other substances that ensure the growth of tissue; for instance, foetal calf serum, fibroblast growth factor (bFGF), amino acids, carbohydrates, vitamins, and antibiotics (i.e. penicillin). After becoming familiar with the protocol of myoblast muscle culture (firstly, through the documents we all received before the workshop, and now, through Catts’ and Hellman’s explanations), we are ready to engage in the tedious and meticulous task of observing and counting the cells, exchanging the

¹⁴⁷ The medium is dyed with phenol red, which is a pH indicator that shows whether a change in medium is required and the cells need to be passaged (if the medium becomes yellowish/orange, it means that the cells have used up the nutrients and the solution is filled with the products of their metabolism, that is, waste).

¹⁴⁸ Confluency in the field of tissue engineering refers to the amount of cells in a flask or dish. It describes the proportion between the number of cells and the surface covered by them. See: SymbioticA and Biofilia 2013.

medium, and washing them with sterile PBS solution.¹⁴⁹ The entire procedure – like any task performed in a wet biology laboratory – is governed by detailed protocols, which (for legitimate reasons) put an immense emphasis on sterilisation, aseptic techniques, and correct waste management. We operate on rodent muscle precursor cells or, in other words, myoblasts. Myoblasts, as we learn from the internal workshop documents and protocols, are extracted from the hind limbs and lower back of an animal (in this case a mouse): first the muscle is cut and then myoblasts are isolated from the tissue with the use of enzymatic digestion and filtration through nylon gauze (SymbioticA and Biofilia 2013). We do not see the mice whose cells are used. We are dealing only with the pre-prepared “product:” the cells. In fact, many laboratories simply buy the cell lines or other organic material that they need for research along with their non-biological materials and equipment. There are national and international companies that specialise in the manufacturing of certain cell lines, tissues, proteins, or other products; for instance, Thermo Fischer Life Technologies,¹⁵⁰ GenScript,¹⁵¹ and Selexis,¹⁵² to name just a few.

Throughout the workshop, we discussed the issue of the living in relation to contemporary biotechnology and bioengineering, and this was encouraged by the organisers. During these discussions, we increasingly became aware of an important aspect of laboratory procedures that is rarely considered; namely, the amount of waste produced. At one level, it seems difficult to turn a blind eye to the abundance of disposable gloves, paper towels, and other non-biological elements that have not come into contact with the cells but still go into the waste. At another level, our waste-awareness is raised in realising that the waste from cells and solutions always needs to be placed in autoclave bags that are later incinerated. All hardware that comes into contact with biological elements: cells, tissues, bacteria, etc. should also be autoclaved, and is

¹⁴⁹ PBS allows for the removal of traces of serum from the cells.

¹⁵⁰ Thermo Fisher Scientific 2015.

¹⁵¹ GenScript 2015.

¹⁵² Selexis 2014.

often incinerated. Biological waste is always seen as potentially hazardous: it carries the potential for escaping the set frames. Every scientific institution that deals with living organisms or biological substances has protocols describing in detail the procedures for waste management, and specifically biohazardous waste management. These documents are usually consistent with more general regulations (e.g. state, or EU regulations) concerning biohazard and waste management.

One of the points on the agenda for the fourth day of the workshop is the procedure for eliminating the living. In other words, our hands-on engagement with life in the biolab resulted in a significant number of petri dishes full of *E. coli* bacteria modified with a fluorescent jellyfish protein and flasks of mouse muscle skeleton tissue suspended in medium. These lives are abundant, and because – we are told – they are useless for Biofilia’s other tasks, they have been categorised as waste. The elimination of the “useless” living is not marginalised and the leaders of the workshop carefully attend to the issue: these organisms, cells, and tissues have worked for and with us, and the sacrifice of their lives (as it is often framed in the narrative that emerges during the workshop) needs to be performed with care. It is worth remembering, however, that the destruction of life in a biological laboratory is an everyday scientific procedure and a standardised routine. The non/living in its biological aspects is virtually uncontrollable and may slip through human (scientific and technological) control. The potential of living cells, bacteria, or viruses fleeing sterile and tight containers is real, yet not always actualised. This is also why all possible measures are taken in order to make sure that “life” remains contained within the prescribed frames and is eradicated whenever there is a chance for it to slip beyond them. Along with the actual risk of biohazardous substances and living forms surpassing the limits of laboratory flasks, which is emphasised by Catts and Hellman, there are also the cultural imaginaries surrounding the issues of contamination, contagion, pollution, and impurity that implicitly contribute to scientific and popular-scientific discourses on laboratory safety.

Each of the workshop's groups is assigned the task of devising its own way of killing and paying tribute to the life forms with which we worked. The only restriction is that the group's solution must adhere to laboratory regulations. According to the protocol, the living forms first need to be treated chemically (bleached), then placed in autoclave bags, autoclaved, and incinerated. Although we are not directly involved in the autoclaving and incinerating, anything that happens until the moment of packing the dishes and flasks into autoclave plastic bags – provided it meets the protocol – is our choice. We are reminded, for instance, that in Japan scientists have an annual ceremony of remembrance dedicated to all the life forms (including microorganisms) whose lives were used for human goals (SymbioticA and Biofilia 2013), and that in Novosibirsk, Russia, there is a lab rat monument commemorating the animals used in genetics research.¹⁵³ Encouraged to use our imaginations, and focused on the issue of responsibility, my group comes up with the idea of performing a kind of “firing squad.” The firing squad is a form of execution used in the military and particularly during times of war, in which the one(s) to be executed is/are simultaneously shot by several people. While historically there have been different ways of arranging it,¹⁵⁴ the firing squad generally consists of issuing one or several shooters with a weapon containing a blank charge. The members of the firing squad are not informed beforehand whose gun contains live ammunition. The idea behind this is to “diffuse responsibility” and make each shooter believe that perhaps s/he personally did not discharge the fatal shot during the execution. Following this idea, we take three identical glass containers: one of them is filled with bleach, the other two with water. One of the workshop participants who is a member of another group rearranges the containers for us, so that we do not know which of them contains bleach and which are filled with water. Each of us takes one container and we simultaneously pour the liquid into every dish and flask, killing the cells and microorganisms. In this way, we are not really sure

¹⁵³ See: Wahlstedt 2013.

¹⁵⁴ See e.g.: Palmer Jr. 2008, 189–190; Johnson 2015; and Corns and Hughes-Wilson 2005.

who actually did the killing: who poured the bleach and who poured water. In effect, we performed a “ritual” of diffusing responsibility. Yet, as in the case of military firing squads, in our ritual the responsibility for the killing is still not erased. The “diffusion” in fact means “distribution”: we all agreed to take part in the procedure of killing the microorganisms (and chose the firing squad as a method), we all poured the liquid, and, therefore, all of us take responsibility for the deed. Although the actual death takes place at a micro-level (which allows the participants to distance themselves from the actual processes taking place), the idea of intentional killing evokes a certain uneasiness in the participants. If one takes into account the general social acceptance of, for example, slaughtering nonhuman animals for food, leather, or scientific purposes on a massive scale, the discomfort that arises from killing these cells brings to light many peculiarities concerning the ways in which we understand, frame, relate to, and value the living. The killing of nonhuman animals in the areas mentioned above is motivated by tradition (of eating meat, wearing leather) and scientific progress: these seem to be unquestioned reasons grounded in culture on the one hand, and necessary scientific and technological development on the other. Yet, traditions and cultures are not fixed, immutable, or innocent wholes without a context or power differentials, nor are science and technology driven only by good-will and knowledge production.

1.2. Experiments on Nonhuman Animals and Gratuitous Cruelty

As Hugh LaFollette and Niall Shanks (1994) emphasise, the status of animal experiments in medicine can be traced back to the tradition established by the French physician and father of physiology, Claude Bernard. Bernard was a determinist and believed that physiology was governed by the same laws as physics: “He thought species differences were not ultimately qualitative (resulting from evolutionary differences in complexity and organization) but quantitative. Once we make suitable mathematical adjustments for quantitative differences (e.g., body weight), we can apply experimental findings from one species to problems of interest in another” (LaFollette and Shanks 1994, 200). As a

result, Bernard considered animal experiments in the laboratory to be legitimate science. Simultaneously, he downplayed the role of clinical medicine and epidemiology, and rejected the theory of evolution. Bernard's views and methodology became paradigmatic for twentieth-century physiology. While his work was pioneering in the mid-nineteenth century, LaFollette and Shanks argue, the unquestioned acceptance of the Bernardian paradigm by twentieth-century physiologists "has likely hindered medical advance by insisting on a single-minded methodology which assumes all significant advances come from laboratory experiments on non-human animals" (ibid., 207). In other words, the acceptance and firm position of nonhuman animal experiments in the context of biology and medicine have primarily resulted from an uncritical reliance on scientific tradition. While contemporary scientists look at experiments on nonhuman animals in a more nuanced and critical way, the argument for the necessity of animal experimentation often appears appealing to laypeople "susceptible to the self-assured proclamations of some researchers" (ibid., 207). LaFollette and Shanks illustrate this point by citing embryologist and anatomist James G. Wilson: "Judges and juries may not be able to evaluate the scientific implications of primate studies, but they are favorably impressed when a manufacturer [of a pharmacological drug] appears to have done more than the required minimum by testing his product on pregnant primates" (Wilson cited in LaFollette and Shanks 1994, 207). Yet, the extrapolation of experiments from one species to another often fails. Numerous studies and reports show that experiments on nonhuman animals are not only inefficient, but also dangerous if the results are extrapolated to another species (in this case, humans): for example, as Corina Gericke (2011) notes, a U.S. Food and Drug Administration report from 2004 states that 92% of potential pharmaceutical drugs that are shown to be safe in animal tests do not pass clinical trials.¹⁵⁵ Scientists and activists from such

¹⁵⁵ See: U.S. Food and Drug Administration 2004. Gericke (2011) also refers to Pfizer's representatives' statement, according to whom "Only 5–25% of the substances harmful to humans also have adverse effects on the experimental animals" (*Münchener Medizinische Wochenschrift* cited in Gericke 2011, n.p.). She also cites studies showing

international organisations as The European Coalition to End Animal Experiments (ECEAE),¹⁵⁶ Ärzte gegen Tierversuche e.V. [Doctors Against Animal Experiments Germany],¹⁵⁷ the International Network for Humane Education (InterNICHE),¹⁵⁸ and Cruelty Free International¹⁵⁹ are working towards the abolition of all animals experiments and the implementation of alternative methods that are more efficient and reliable, as well as cheaper (e.g. *in vitro* research utilising human cell, tissue, and organ cultures, and computer models).¹⁶⁰ The issue of the common acceptance of the use of nonhuman animal bodies in science shows that such an attitude relies more on tradition and belief than on actual scientific knowledge. In contrast, the killing of cells and tissues in the context of bioart is legitimised by artistic and critical purposes, which seem to be perceived as less valid and without practical value, and therefore create a feeling of discomfort among many of the participants in the workshop.

1.3. The Non/living, Waste, and Containment

Tinkering with living substances in a bioartistic laboratory raises two key issues, which continually arise in this context where life in its biological generativity and materiality is at stake. In order to comprehend how life

the number of patients affected by serious or lethal effects after the application of drugs that had been approved as safe in animal tests: 58 000 in Germany alone (Schnurrer and Frölich 2003 cited in Gericke 2011). Furthermore, Gericke (2011, n.p.) continues, “in Germany approximately 2500 new applications for pharmaceutical drug approval are filed each year, of which there is only one real innovation every two years.” Each drug undergoes a series of tests on nonhuman animals. While there are 60 000 pharmaceutical drugs available on the German market, only “325 medicines are actually essential,” according to the World Health Organisation (Gericke 2011, n.p.). This data suggests that the surplus of drugs (both proposed for approval and already present on the market) is accompanied by an additional number of animal experiments that could easily be avoided. It is difficult to evade the conclusion that these nonhuman animal lives are directly transformed into waste.

¹⁵⁶ See: The European Coalition to End Animal Experiments 2002.

¹⁵⁷ See: Ärzte gegen Tierversuche e.V. 2014a.

¹⁵⁸ See: International Network for Humane Education 2012.

¹⁵⁹ See: Cruelty Free International 2015.

¹⁶⁰ See: The European Coalition to End Animal Experiments 2011; Ärzte gegen Tierversuche e.V. 2014b.

is redefined, reconceptualised, and shaped through bioart, one has to look closer at these two aspects. Firstly, dealing with the non/living in bioscience, and thus also in bioart, entails the question of the control and predictability of life, of the possibility of containing it within the prescribed, spatiotemporal frames. Secondly, the non/living in bioscientific and bioartistic contexts is closely entwined with the issue of waste. Meanwhile, waste, when classified as biohazardous, links back to the problem of contagion. Thus, understanding what life – shaped through hybrid artistico-scientific practices – means, requires a thorough consideration of the place and role of these two aspects: the problem of the disposable and the always-already-fleeing-control character of biomatter.

In the following sections, I first look at one of TC&A's artworks, *Victimless Leather – A Prototype of Stitch-less Jacket Grown in a Technoscientific "Body,"* displayed in 2010 at the Mori Museum in Tokyo,¹⁶¹ which challenges the problem of the management, control over, and containability of life in unexpected ways. Along with the uncontainability of life, the specific version of *Victimless Leather* shown at the Mori Art Museum demonstrates what happens if the living artwork "goes wrong," mutates, or turns into something that is no longer considered desirable by either the audience or the curators. In other words, what if the artwork becomes something that is deemed waste long before it would normally transform into a "useless" biohazardous organic substance? In this instance, the life of this particular jacket develops in an unpredictable way: a fungal contamination accelerates the inevitable process of becoming-waste and, thus, places the intersection of uncontrollability and disposability at the very centre of the contemporary understanding of life and the living. The artists, when commenting on the appearance of fungi on the leather jacket, clearly state: "you cannot control life," but the question remains as to what this means in an ontological sense.

¹⁶¹ See: Mori Museum 2009.

The issue of waste and the disposable is connected to the issue of life, and not merely in a bioscientific or bioartistic context. Although it is not my aim here to give a thorough overview of the multiple disciplines and enquiries that tackle the question of waste in its relation to the non/living, I will briefly show how this issue is approached multi-dimensionally in contemporary theory. Such a sketch will allow for a better understanding of the discourses contributing to the bioscientific understandings of life–waste assemblages that constitute a crucial part of my concern in the present chapter.

Finally, I focus on the ways in which the ideas of uncontainability and uncontrollability of the living are demonstrated in growing and exhibiting the version of *Victimless Leather* that later became contaminated. In tracing the different components of the assemblage of the non/living, waste, and containment, the chapter itself has a spiral structure: with each section it attempts to connect, deepen, and elaborate on what has been said in the preceding parts.

2. Disposing of Art

2.1. Victimless Leather

From November 2009 until February 2010 Catts and Zurr (TC&A) showed their project, *Victimless Leather* as part of the exhibition *Medicine and Art: Imagining a Future for Life and Love* at the Mori Art Museum. As I discussed in Chapter Two, the *Victimless Leather* piece forms one third of the series *Victimless Utopia*. Each time the artists present their semi-living sculptures, they have to grow the objects anew in a local laboratory, as travelling with the pieces is either impossible or too difficult (for both technical and legal reasons). The biopolymer scaffolding of the artwork prepared for the exhibition in Tokyo took the shape of a kimono. During the very early stages of the show, when the tissue had only just begun to grow over the base, the sculpture became infected with fungi. For ten days following the appearance of the infection, Catts regularly applied antifungal treatment to the artwork.

Despite his efforts, the fungi took over, resulting in a flower-shaped excrescence positioned right next to one of the sleeves.¹⁶² Moreover, since the kimono was required to be alive and in “good shape” for the three months of the show, local scientists had to re-grow the sculpture twice and care for the artwork on a daily basis (Johung 2014).

Technically speaking, the tissue of the *Jacket* has a hybrid character. It is a combination of mouse and human cells:¹⁶³ 3T3 fibroblast mouse cells¹⁶⁴ and HaCat keratinocyte human cells,¹⁶⁵ which are seeded onto a synthetic, biodegradable, bio-absorbable, 3D, polymer scaffolding, which is placed in the sterile conditions of a customised bioreactor designed as an organ perfusion pump.¹⁶⁶ The bioreactor is equipped with a special drip system through which the tissue is provided with nutrient solution. It is also important that an appropriate and stable temperature is guaranteed. As well as practical, technical, and historical aspects, the design of the bioreactor in which the jacket has been grown through each of the exhibitions (more than ten times since 2004) also exhibits specific aesthetic characteristics. The spherical shape of the container in which the sculpture is placed, combined with the drip system with its exposed glass containers and pipes filled with pink-coloured nutrient solution and accentuated by red lighting, speak to the cultural imaginaries of how

¹⁶² See: The Art Catalyst 2012.

¹⁶³ Some may suggest that this fact entails doing away with speciesism through the hybridity of the artwork. On the other hand, the combination of rodent and human cells in the leather jacket mirrors the traditional place of animals in a laboratory, where mice are used, exploited, and killed in research that serves human purposes. An example of this is discussed by Haraway (1997): the OncoMouse, a type of laboratory mouse whose genetic material has been modified in order to carry an activated oncogene. Currently, several different kinds of oncomice (not only the OncoMouse developed at Harvard University and described by Haraway) are being used worldwide in cancer research.

¹⁶⁴ The 3T3 cell line was established in 1962 by George Todaro and Howard Green, two scientists working at the Department of Pathology in the New York University School of Medicine, and originates from a Swiss albino mouse embryo. 3T3 cells are used in bioscientific research as an “environment” and growth factor (or “feeder cells,” as Adele Senior (2008, 80) puts it) in the cultivation of other types of cells, especially keratinocytes (the dominant type of cell in the epidermis, the outermost layer of skin).

¹⁶⁵ The HaCat cell line was developed from cells taken from a 62-year-old male patient with skin cancer (Senior 2008, 80).

¹⁶⁶ mediasanctuary 2014.

science is supposed to look. Simultaneously, the installation evokes memories of science-fiction stories featuring the figures of “mad scientists” and their futuristic bio-experiments that audience members might have read during childhood. The shapes and colours both speak to one’s imagination and bring visual pleasure.

Nevertheless, the issue of sterility in animal tissue culture, emphasised by both bioartists and scientists, is a difficult one. It is not only fungi (the presence of which on the jacket in the Mori Museum was easily noticeable with the naked eye) that find a comfortable “home” among growing animal cells. In fact, animal tissue cultures are prone to contamination not only with fungi, but also with less detectable organisms, such as bacteria, as well as mycoplasma and viruses, which are even more difficult to recognise.¹⁶⁷ This is also why the issue of sterility is so heavily emphasised in protocols dealing with tissue engineering. As the fungal growth on the jacket was noticed only after it had become completely visible without the employment of any optical devices, and immediately afterwards the anti-fungal treatment was applied, we do not really know if there were any other actants present in the bioreactor, especially since, for some of them, such as mycoplasma, it takes a relatively long period of time for a generation to grow. In a way it was the practices of creating and exhibiting bioartworks that in this case excluded the presence of any other potential living components of the infected jacket, while rendering the mammalian tissue and the fungi meaningful.

As I emphasised many times in Chapter Two, there is nothing victimless about *Victimless Leather*; the entire concept behind the project (including the other parts of the series *Victimless Utopia*) is precisely to point out that victimlessness – relating to the project itself and to our

¹⁶⁷ *Mycoplasma* is a genus of bacteria that are very small and do not have cell walls; therefore, they can be present in an environment containing penicillin and streptomycin, and inside host cells. It is only possible to detect *Mycoplasma* through an electron microscope or with the use of biochemical methods. Viruses can also only be detected by the employment of fluorescent or electron microscopy. In both cases the only noticeable signs are possible changes in the growth of the culture, an increase in waste, and the death of cells. See: Martin 1994; Mather and Roberts 1998.

being, and our living in and “consuming the world”¹⁶⁸ – is pure illusion. Through technology, science, and industrial farming, we simply push the victims further away, to the sphere of the forgotten, hidden, invisible, “undesired,” and waste. Cell lines that are currently industrially manufactured had their origin in living animals: mouse embryos in the case of 3T3. The artists openly acknowledge that they are deploying irony in their reference to the idea of victimlessness; however, this fact is rarely taken up by the media. They also note that, in the case of *Victimless Leather*, almost every time they grow and exhibit the sculpture, “something goes wrong,”¹⁶⁹ that is, the living of the leather jacket does not necessarily follow the growth and development planned by the artist. The boundaries of the sculpture, because they emerge from feeding, breathing, metabolising, and multiplying/growing that are specific in each case, are not always consistent with those imagined by the artists or anticipated by the audience.

2.2. On Tissues, Excess, and Waste

In a similar way to the outgrowth of cultured tissue in another *Victimless Leather* exhibit (Museum of Modern Art, New York 2008),¹⁷⁰ the fungi disturb the illusion of a neat and valuable, yet living, artwork. The TC&A artists are undoubtedly aware of the reality masked by this illusion. Catts and Zurr often tell the story of the Tokyo exhibit as an anecdote to demonstrate the impossibility of having complete control over life processes, a fact which, they argue, the popular discourses on science, designers, and biotechnologists frequently fail to recognise. The duo wishes their work to disturb and fail: art as a field, in contrast to design, for example, does not aim to provide solutions, but instead to generate questions, to trouble the viewer, and open up different ways of thinking

¹⁶⁸ mediasanctuary 2014.

¹⁶⁹ Aside from the aforementioned exhibitions at the Mori Museum (2010) and MoMA (2008), there was also another case at the *Sk-interfaces* exhibition in Casino Luxembourg in 2009. See: mediasanctuary 2014.

¹⁷⁰ See: Schwartz 2008.

and sensing.¹⁷¹ The appearance of fungi at the Mori exhibition and the abundant tissue in the show at MoMA are disruptive, matter out of place that should instead be removed, neutralised, and discarded. The problem is that none of these unwelcome appearances can be removed without affecting – or, more precisely, killing – an artwork. Fungi and abundant out-of-control cells, which are perceived by some of the curators, commentators, and members of the audience as waste, something excessive, illustrate indeterminacy, uncontrollability, and vulnerability as key features of what we deem as the “living.” Despite measures being taken to guarantee optimum conditions for the growth of the tissue, it is impossible to determine all aspects of its development: there is always a risk that the tissue culture may become infected with microorganisms or grow too fast for the available space and nutrients, for instance. These aspects can only be estimated; they cannot be fully determined. Furthermore, TC&A’s *Jacket* does not constitute an independent entity attacked by an external enemy: the fungus. In fact, the contaminated tissue forms an assemblage, which mutates, changes, transforms, and in which the divisions and relations between “proper tissue” and infecting microorganisms, and between processes of growth and decay, are shaped.

The infected – affected – tissue also evokes a broad sense of the intertwinement of life and waste: how that which has been discarded impacts the living embodiments of both a human and a nonhuman kind; and how the line between things and processes that are deemed to be “life,” and those that are abundant and disposable, becomes blurred. It is common for organic matter initially framed as “life” to later become categorised as “waste”: this is precisely what happens to the cells, tissues, and organisms used in bioscientific experiments; once their bodies have been experimented on and, subsequently, are no longer needed for research purposes, they become (biohazardous) waste. For living matter to be ascribed a value (the status of life) or a lack thereof (waste) often entails further consequences. In the context of a laboratory, once a fragment of biomatter is discursively and materially transformed into

¹⁷¹ See e.g.: Neustein 2012.

waste, it either requires disposal and neutralisation (that is, killing and incineration, as in the case of the no-longer-needed tissues in our experiments during the workshop), or, in some cases, it may be used as a resource in biomedical research or industry (as has happened with umbilical cord blood in the context of regenerative medicine).

The dichotomy of life and waste may be seen as parallel to Agamben's distinction between *bios/zoe* and bare life. While *zoe* in Agamben's writings describes biological existence, "bare life" refers to life "Stripped from political significance and exposed to murderous violence" (Ziarek 2012, 194). Agamben's bare life, as Ewa Plonowska Ziarek argues, is "wounded, expendable, and endangered, [it] is not the same as biological *zoe*, but rather the remainder of the destroyed political *bios*" (ibid., 195). Life-deemed-waste in a biolab is stripped of its scientific value and significance and, thus, exposed to neutralisation and killing. In a similar way, for Agamben, life deprived of its political value, status, and significance becomes exposed to violence and slaughter. Thus, both life-deemed-waste and bare life hinge on the notion of value. To turn into waste means to lose worth, significance, or purpose. This becomes clear in the contemporary discussion of tissue economies, which I will discuss below.

In the context of biological matter, the category of waste appears to function as a factor in delimiting what qualifies as life that matters: life that is ascribed value. Waste refers to that which is *no longer* considered to be life in a full sense (meaning: valuable life) and, as such, it implicitly requires a response: stabilisation, neutralisation, and eradication. Tissues, cells, and fragments deemed to be waste carry diverse potentials: they still undergo processes thought to be characteristic of life in a traditional sense (metabolism, multiplication); however, they may turn into infectious agents causing the death of human and nonhuman organisms, or they may become useful resources for biomedical research. While it is characterised by unstable boundaries, in a laboratory context, the notion of waste seems to function as a tool delimiting that which is defined as life worthy of consideration.

The living and the disposable are not only intertwined in the frame of bioartistic practices and creations, but also in the area of medical tissue management. In this field, as Catherine Waldby and Jonathan Mitchell explain, the notion of biomedical waste is used to describe tissues and organs that have been removed from the human body. Simultaneously, the category of waste, as Waldby and Mitchell argue, forms the precondition for biovalue, that is, “the capacity of tissues to generate new and unexpected forms of value” (2006, 108–109). The story of the infected *Jacket* illustrates the complexity of the material and conceptual relationality between life and waste; or, more specifically, between the biological processes of the living and the material-discursive frames of the disposable. Yet, before I focus on the mechanisms that operate between the non/living and the disposable, let me first take a closer look at the concept of waste itself and the variety of ways in which it is inserted into different unfoldings of what can broadly be framed as life (and in that sense not only the life of the cells and tissues of bioartistic projects).

3. Between Different Lives of Waste

The discarded, described with a variety of terms such as trash, scrap, rubbish, debris, garbage, junk, and waste, and seen as *a problem*, has begun to take centre stage in modernity and constitutes one of the most urgent issues of today.¹⁷² As already mentioned, research on waste has been growing during the past few decades, encompassing various fields ranging from environmental science, business, and media studies to social science and philosophy, and finally forming its own area, known as critical discard studies.¹⁷³ This is not surprising when one realises, as Gregg Kennedy (2007, 20) remarks, that until very recently New York City’s Fresh Kill Landfills (currently transformed into a recreational area) was one of the two man-made objects visible to the naked eye from space. The organic and biohazardous waste that originates in bioscientific laboratories, and with which I am primarily concerned, forms only a

¹⁷² See e.g. Rootes 2009.

¹⁷³ See e.g. Liboiron 2015.

limited subarea of discard studies. Yet, the understandings generated by research on waste do affect the ways in which the relation between the idea of the disposable and the bioscientifically and bioartistically manipulated living is framed.

The word “waste” (as a verb “to waste”) can be traced back to the Anglo-French and Old North French word *waster* “to waste, squander, spoil, ruin”, and to the Latin *vastare* “lay waste” and *vastus* “empty, desolate, waste” (Harper 2015c). In this way, waste as a noun refers to that which is disposable, discarded, consumed, destroyed, or devastated. As a verb it draws attention to the processes of consuming, deteriorating, utilising, employing uselessly, and spending. Since the 1960s “to waste” may also mean “to kill.”¹⁷⁴ Cells, tissues, and organisms that undergo laboratory procedures are virtually deemed waste, and thus, killed. The actualisation of this potential, that is, the killing, happens either through experimentation or – once the living has fulfilled its scientific role – through neutralisation and incineration. In the context of consumption, waste is constituted through its temporal dimension: the useful becomes worn out, exhausted, and drained. Also, time, experienced as idleness, emptiness, or laziness, can be seen as waste.¹⁷⁵ The question of how something becomes disposable is, thus, linked to the issue of expenditure. The act of consumption could be one way of causing a shift in the ontological status of a thing (ibid., xv). According to John Scanlan (2005), waste can be thought of as an integral element in the system of human values and, hence, as Kennedy reminds us, “on the macro level nature wastes nothing” (Kennedy 2007, 2). Before delving into the intricacies of conceptualising waste and its connection with bioart and control over the living, I will briefly review the various formulations of the disposable that, I believe, highlight its relation to the materiality of life.

¹⁷⁴ See: Harper 2015c.

¹⁷⁵ See: Viney 2014.

3.1. Electronic Waste

There is a growing field of enquiry concerning electronic waste (e-waste). As Jussi Parikka (2011) points out, it traces multiple materialities – of media, media processes, and devices – and the ways in which they and their fates are entwined with vulnerabilities and bodily materialities of human and nonhuman kinds. After being used, electronic equipment often travels to developing or newly industrialised countries (like China and India), where it is recycled, releasing numerous substances (cadmium, lead, and mercury) that are dangerous both to the bodies of those who work with them and to the local environment. Electronic media are enmeshed in the processes of global capitalism, economics, and politics, and participate in both macro- and micro-ecologies of different kinds. This takes many forms: firstly, whereas the minerals that form an integral part of the devices we use (such as phones, computer screens, tablets, etc.) have genealogies that are entangled in the gory violence and wars in the Democratic Republic of Congo, as Parikka (*ibid.*) describes, the after-life of electronic junk reconfigures the living and dying of organisms of various kinds and their milieus (often thousands of miles away from where the appliances were used). More specifically, many of the minerals: tantalum, tungsten, tin, and gold, are sold by rebel forces from the Democratic Republic of Congo, who use the profits to finance their war, which involves extreme levels of violence, “particularly sexual- and gender-based violence” (The Dodd-Frank Act, cited in Torres-Spelliscy 2013, n.p.). Once electronic devices become outdated, they are moved to their final destination in landfills or incinerators, often located in the global south, where they still poison the fleshy materialities of human and nonhuman life. In this way, such devices, which are born in struggles of life and death, “end their life” by creating new struggles of life and death.

3.2. Uncontainable Landfills

Dumps, especially in the western cultural and geographical context, can be seen as sites of forgetting, sites that are constantly being removed from

sight, but keep coming back. In her research on landfills in the Northern Canadian Territories, Myra Hird (2012; 2013) traces the lively, material intertwinement of microorganisms, human waste, and the geological layers and processes that change and flow through space and time. Landfills, she argues, are places where putrescible material is constantly transformed by microorganisms and geological processes: landfills are “living natural flows, where multitudes of bacteria collaborate with human debris and geological forces in creating entities, some of which we know need managing, and other entities – contaminants of emerging concern – that have yet to be identified, and whose management is therefore virtual” (Hird 2013, 107). In this way, Hird continues, we are dealing with an asymmetrical set of relations, in which humans do not hold the autonomous or dominant position of an actor who controls and manages other processes and forces and has the capacity to determine their results. Instead, looking from a geological perspective, humans are “latecomers to life’s already long-established flourishing and failing within a volatile landscape” (ibid., 115).

As Hird emphasises, humans and nonhumans alike are characterised by their shared vulnerability: they are interdependent with other entities and forces, and are exposed in different ways to organic and inorganic, living and non-living, earth processes. Against this background, Hird formulates the concept of an environmental ethics of vulnerability based upon “the asymmetric relationship between geo-bacterial liveliness and humans” (ibid., 107). She employs Robert Goodin’s notion of the relation between responsibility and vulnerability, in which responsibility “is generated by the vulnerability of others to our actions and choices, however direct or indirect” (Hird 2013, 115), and extends this formulation in a double way: firstly, Hird’s notion of vulnerability refers to others of both human and nonhuman kinds; and, secondly, it is concerned with responsibility for our actions and choices, and for their consequences in the present and future alike.

Furthermore, Hird claims that waste can also be considered a problem of an epistemological nature: conceptualising waste in current social, economic, and political contexts raises the issue of the indeterminacy of

that which, despite careful efforts, fails to become determinate: the heterogeneous materialities of landfills evade measurability, whilst rendering waste management a potential failure. As she explains, the idea of waste management, which is emphasised by both national and international institutions and experts, is grounded in an endeavour to determine that which is indeterminate. Landfills are sites where all sorts of matter – such as “diapers, dead pets, plastics, food, fabric, furniture, wrapping paper, batteries and appliances” (Hird 2012, 456) – are mixed together. When placed in a landfill, this amalgam of materials interacts with bacteria and weather conditions (precipitation, wind, temperature), resulting in leachate “composed of putrescible viscous material created through bacterial metabolism” (ibid., 457).¹⁷⁶ What exactly happens in this assemblage of discarded materials and microorganisms escapes all efforts to control and manage waste. While engineers seek to design technological solutions that could determine and guarantee the containment of waste, Hird writes, “Successful landfill design and aftercare ... extends to perhaps one hundred years, a mere moment in geological and bacterial time” (ibid., 465). Hird invokes Barad’s understanding of indeterminacy as an infinitely open “condition for the possibility of all structures in their dynamically reconfiguring in/stabilities” (Barad 2012b, 214) in order to talk about waste as intra-active matter, where entities are not fixed, immutable, stable, or determinate. Understanding waste consists of making provisional cuts between that which can be determined and, thus, managed through technology (for example, recycling), and that which remains indeterminate, “bracketed out,” and uncontainable (like organic and inorganic processes in the landfilled waste). Thus, such an understanding of indeterminacy also taps into notions of the uncontrollability and uncontainability of the non/living in a bioartistic (but also, bioscientific and biotechnological) practice: despite the hope that humans can control

¹⁷⁶ As Hird explains, leachate is “a heterogeneous mix of heavy metals, endocrine disrupting chemicals, phthalates, herbicides, pesticides, and various gases including methane, carbon dioxide, carbon monoxide, hydrogen, oxygen, nitrogen, and hydrogen sulphide” (2012, 457).

the manipulated tissues by following protocols (in a similar way to controlling waste by employing the newest technological solutions), the material carries the potential (and often manages) to evade the prescribed scenarios.

The question of how the materiality of waste has always been enmeshed (temporally and spatially) with economic and political factors underpins the various attempts to conceptualise the question of waste (an example of such a way of thinking can be found in Kennedy (2007)). For example, current rates of global consumption and the related discarding of goods render commodities disposable. Global industrial systems extend and enhance bodily abilities to excrete, eliminate, and evacuate.¹⁷⁷ As Kennedy emphasises,

When we discard a banana peel...we throw away with it the tires, asphalt, spark plugs, work boots, fuels, pipelines, paper invoices, boxes, computer chips, television screens, newspaper flyers, and all other countless objects required to produce, deliver, and market the commodity. The global effluent of each instance of consumption is the excrement of the technologically externalized body. (Kennedy 2007, 52)

Waste, especially when seen in this global perspective – in its volume, dynamics, and omnipresence – is not only that which reason has to expel in order to preserve its coherence and integrity,¹⁷⁸ but also that which we try to erase. This is all too visible in the case of landfills relegated to the margins, sometimes thousands of kilometres away from the source of waste. In the *Canada Waste Flow* project¹⁷⁹ Hird and her collaborators investigate the ethico-political, economic, cultural, and historical aspects

¹⁷⁷ On the relation between the disposable and consumption, see also: Lucas 2002 and Hawkins 2006.

¹⁷⁸ When referring to anthropologist and cultural theorist Mary Douglas's work *Purity and Danger: An Analysis of Concepts of Pollution and Taboo* (2004), Kennedy notes: "What reason cannot conceptually work with, it relegates to the negative classification of dirt and pollution ... Reason cannot help categorizing things, and so it employs 'dirt' as the default category that appears in the absence of rational comprehension. Thus, the concept of dirt and waste is where, so to speak, reason loses its grip and where this definitively human faculty malfunctions" (2007, 6).

¹⁷⁹ See: Canada's Waste Flow 2015.

of Canada's management of industrial, nuclear, and communal waste. Due to increasing amounts of waste and decreasing space in available landfills, every year Canada transports tonnes of waste either between different regions of the country (often disposing of the most dangerous waste in the Northern Territories) or abroad to the United States, Mexico, and China (Hird, et al. 2014). In this way, waste is deemed to be moved out of sight and out of memory; however, in effect, this practice is about neither seeing nor remembering in itself, but about who has the luxury not to see and who has the privilege of not being materially affected by the waste – in other words, it is a question of environmental justice. For those whose dwellings are located near the waste disposal sites (as in the case of indigenous communities in the Canadian Northern Territories), the surrounding landfills cannot be easily forgotten; for, not only is the waste visible, but also the gases it produces are toxic and affect their health.¹⁸⁰

Taking into account the scale and virtual character of waste (the non/living carries a potential for becoming waste), one may see this potential as one of the fundamental elements of our condition. Here, I focus on one particular aspect of examining the disposable; specifically, I ask what happens to the definition of life if life itself becomes waste? This question might not seem entirely new if one recalls Zygmunt Bauman's (2004) discussion about the notion of "wasted lives" in the context of modernity, neo-liberalism, and advanced capitalism, which cast underprivileged populations as "unfit" and "undesirable," and "cannot proceed without degrading and devaluing the previously effective modes of 'making a living' and therefore cannot but deprive their practitioners of their livelihood" (ibid., 5). While the lives discussed by Bauman are equated with the lives of human subjects by default, my discussion here centres on the very materiality of life itself as it takes centre stage in the hybrid laboratory practices of bioart, beyond and below the level of the human.

¹⁸⁰ Hird discussed these issues in her talk "Proliferation-Extinction-Anxiety and the Anthropocene Aesthetic," given at the Life Matters Conference, 26–28 May 2014, Linköping University, Sweden.

4. Wasting Life

In the Introduction, I mentioned how bioartistic practices that focus on the bioengineering of tissues emerged as a commentary on bioscientific research dealing with stem cell lines and tissue culturing. The current state of medical research and biotechnologies allows for different types of human tissue (not only blood, but also skin, stem-cell lines, and embryos) to be stored, preserved, studied, manipulated, and distributed between donors and recipients – tissues become productive *in vitro*, outside of the (human) body. This contributes to the formation of networks of exchange of bodily materials that are inscribed in the logic of biopolitics and advanced capitalism. This results in the emergence of what Waldby and Mitchell describe as “tissue economies,” which involve “hierarchizing the values associated with tissue productivity” (Waldby and Mitchell 2006, 31). Taking their point of departure in Robert Titmuss’s study *The Gift Relationship* (1970), which focused on blood donation in the United Kingdom and the United States after 1945, they enquire into the transformation of tissues into commodities, the ascription of different values, and the various systems of tissue distribution. What is crucial, however, is that along with the two traditional kinds of tissue economy: that of gift (tissues voluntarily donated by providers as an act of civic responsibility and without any material profit accruing to them; these are usually redistributed by the national system) and of commodity (providers are paid for tissues; this redistribution system is privatised and organised in the form of a market), Waldby and Mitchell also distinguish a third, peculiar form of tissue economy: an economy of waste. Tissue waste here concerns more than just that abundant “matter-out-of-place,” it is also a useful category for efficiently managing and, most importantly, recycling the superfluous bodily matter taken from donors, who are not always aware of which of their tissues have been managed or recycled. This category handles tissues through shifting ontological definitions: defining them in one way while they are still in the donor’s body and then differently the moment they are removed to be used as scientific materials or the object of research. In contrast to Titmuss, Waldby and Mitchell do

not see the gift and commodity systems as completely separated from each other, but rather, as frequently overlapping or affecting one another.

4.1. Tissue Economies, Biowaste, and Biovalue

Tissue donation, like bioscientific research, involves certain levels of waste.¹⁸¹ As Waldby and Mitchell emphasise, “one of the fundamental movements of any successful form of economy is the circulation of waste objects from unprofitable to profitable contexts, where they can be resignified and redeployed” (2006, 84). The authors discuss two cases in which tissue goes from being classified as bodily waste to becoming a precious biological material, or a commodity of therapeutic value. They do this in order to argue that, the more crucial a tissue is considered for the human body, the less probable that it will be seen as potential waste. For instance, blood, bone, and skin are considered essential to the integrity of the organism, whereas organic fragments and tissues evacuated by the bodily system (e.g. hair, pus, saliva, faeces, and sweat) are viewed as abject, objectionable, or, to put it simply, waste.

The first example of such a resignification of value described by Waldby and Mitchell is the *Moore v. Regents of the University of California* case. In 1976, John Moore, a patient who was suffering from hairy-cell leukaemia, was advised by Dr David Golde to have his swollen spleen surgically removed. Thanks to this, Moore’s blood became stable again and the illness remained in remission until the 1990s. Later it transpired that Golde had been aware of Moore’s spleen cells’ unique capacity to produce extraordinary amounts of lymphokines, which are

¹⁸¹ The relation between tissues, living matter, and waste forms a key aspect of two long-standing feminist debates around reproduction: abortion and *in vitro* fertilisation (IVF). In the case of the right to abortion, advocates tirelessly fight against “pro-life” arguments, such as the idea that “life begins at the moment of conception,” promoted by the Vatican and other Christian fundamentalists. According to this “pro-life” reasoning, abortion turns “life” (the foetus) into “waste,” and is thus immoral. This debate has spilled over into discussions on IVF, in which “pro-lifers” claim that, by discarding embryos, the procedures of assisted reproduction also transform “life” into “waste.” Doing justice to these issues, however, transcends the bounds of the present dissertation.

protein mediators enabling communication between the cells of the immune system. He used the tissue that he had removed for his research, which resulted in the creation of an immortal cell line, subsequently patented in 1984 as the “Mo” cell line (with Golde and his collaborators named as the inventors). When Moore learned about the scientific use of his tissue and the patent, he sued UCLA for “stealing his tissue” (as it was framed): for the use of his tissue without his knowledge and consent, and the commercial use and profit from it as a patented cell line. As a patient and “donor” of the material, Moore demanded a share in the profits. The case was taken up by several courts; however, the final ruling of the California Supreme Court was that Moore has no property rights in his tissue. Drawing on Michel Callon’s concept of “disentanglement,” Waldby and Mitchell argue that the category of waste functions as a mechanism that generates “the biological and legal separation of tissues from Moore so that an immortalized cell line could be produced” (Waldby and Mitchell 2006, 90). They show how US discourses concerning biological waste (and its minimisation), human tissues (and the focus on value), and information flow (with an emphasis on scientific progress) contributed to the way in which the concept of waste was deployed in Moore’s and similar cases. In other words, tissue that has been removed from a human body is waste, and, thus, no longer belongs to the person from whom it was removed. Instead, it becomes the property of medical institutions, and can, if desired, be transformed into research material, which can subsequently give rise to medical innovation and even profit. At the same time as discussions concerning the ethical, legal, and economic aspects of the final court decision were taking place across the USA, Congress was debating the regulations concerning patenting, which resulted in allowing private individuals and companies to hold patents for scientific and technological innovation, including biological “inventions” (e.g. the aforementioned cell lines and genetically modified plant and animal species). As Waldby and Mitchell demonstrate through this case, the category of waste is a crucial factor in the creation of biovalue. In cases like *Moore v. Regents of the University of California* and the discourse surrounding it, waste may be seen as constitutive of

biovalue: it forms a key condition for the creation of “the new,” as Waldby and Mitchell claim (ibid., 109).

This example illustrates the ways in which biowaste may be employed and managed aside from its destruction, but, most importantly, it demonstrates how, in the USA, waste becomes an essential element of political and economic discourses concerned with bioscience, biotechnology, and scientific innovation and progress. According to the accompanying narratives, the use of diseased tissue removed from the donor’s body for scientific purposes has the added value of minimising biowaste. Furthermore, the fact that such tissue can now be considered as owned by scientific institutions and not as the property of the donor ensures adherence to biohazardous waste management regulations. Finally, Waldby and Mitchell explain, medical institutions’ ownership of the removed tissues is intended to help avoid potential waste in knowledge production: in other words, it is designed to facilitate the use of these biomaterials in medical research.

4.2. Blood Banking

The discourse on biovalue that is visible in the *Moore* case is also present in Waldby and Mitchell’s second example. They demonstrate how a bodily product that had been considered as (biological) waste, namely, umbilical cord blood, was transformed into a precious biological resource in the context of the twentieth and twenty-first century medicine. Cord blood is now often stored in both public and private cord blood banks as a source of stem cells. When public institutions need to find the best pairing of donated cord blood and a patient in need, they seek out private cord blood banks. These banks maintain accounts for individuals whose cord blood has been preserved, and who thus have a future guarantee that, if they ever require the use of cord blood cells to treat their own medical conditions, there is always a perfect match awaiting them. This is supposed to be seen as a form of bio-insurance for the future. Furthermore, the speculative aspect of cord blood banking consists of conveying a message about projected future possibilities: perhaps one day cord blood stem cells could be used in gene therapies, or modified in

such a way as to acquire the versatility of embryonic stem cells (ibid., 126–127). Former waste now has endless prospective possibilities; in the ideal neo-liberal context, this practice converges with the privatisation and marketing of biobanking. As Waldby and Mitchell (following Nicholas Rose) note, all this contributes to the emergence of a new form of subjectivity: an entrepreneur who focuses on managing risk and takes sole responsibility, while ensuring the maximisation of future health. The fallout is that bodies themselves become “a source of venture capital” invested in the future of biotechnology (ibid., 129–130).

These two examples reveal several key aspects of the discussion around biowaste, which contribute new formulations of life – its management, the fears and anxieties around it, and its political and economic dimensions – to the imaginary surrounding bioscience and bioart. As much as the category of waste forms a pre-condition for the emergence of biovalue, and thus is always already intertwined with the (scientific) significance of living substance in the context of tissue economies, waste in a bioartistic lab is enmeshed with the non/living and forms a potential condition for a bioartwork. Both the prospective biological and economic value ascribed to a living substance and the economic and ethico-political meanings surrounding the concept of biowaste contribute to the ways in which life and its uncontainability are understood and performed through the practices of bioart.¹⁸²

5. Uncontainability of Victimless Leather

Bioart offers more than one perspective in order to shed light on the emerging understandings of life. It is not only the materiality of cells and tissues, processes of growth, multiplication, nutrition, decay, and death

¹⁸² To evoke just one example in which these aspects can easily be noticed in the context of bioart involving tissue engineering, we should recall that bioartistic practice has to comply with biohazardous waste management regulations. Catts and Zurr’s semi-living sculpture – the cruelty-free steak in *Disembodied Cuisine* – for example, was created partly because of the abundance of pre-natal sheep cells cultured at the Tissue Engineering and Organ Fabrication Laboratory, where Catts and Zurr had their research stay in 2000–2001.

that contribute to how the meanings of life are shaped. At first glance, bioartistic projects seem like improvised attempts to tinker with the visceral reactions of living substance, leading to the creation of modern cabinets of curiosities, with life encapsulated within the frames of sterile tubes, dishes, flasks, and other containers. Whether for religious, philosophical, or cultural reasons – as TC&A emphasises – the general public often tends to perceive Catts and Zurr’s practices as simultaneously demeaning the “value of life,” on the one hand, and mesmerising, on the other. The audience’s reactions, and their comprehension of what has been enclosed in the glass containers at a bioartistic exhibition, are moulded by the artworks, the narratives provided by the artists and curators, cultural imaginaries, viewers’ individual backgrounds, and popular-scientific knowledge. Furthermore, the objects are not independent, easily classifiable entities “brought to life” by god-like creators – at least some bioartists would not feel comfortable being labelled in such a way.

Let us return to the case of *Victimless Leather*. Certainly, in that case, the artists were not surprised and, in fact, were satisfied with the unexpected (yet, not improbable) turn of events, as its occurrence challenged the audience’s anticipation of a neat, contained, and controlled living artwork. I suggest that we shift away from an understanding of the infected bioengineered object as the final product and failed goal of the artists’ bioartistic endeavours. Instead of looking at the infected jacket as a contained object displayed in a chosen space and time, we can understand it as an assemblage: a multiplicity of diverse entities and processes that are shaped and transformed through their intra- and interactions, and the boundaries of which are blurred and porous rather than fixed. Furthermore, we can separate the artwork from the processes through which it emerges, or the artists, curators, and audience from the bioartwork, only by making provisional cuts, which do not equate with absolute divisions: rather, these cuts indicate moments of temporal separation, modulation, and modification of the components of an assemblage.

Matter is dynamic; it does not stay still, nor do the different meanings ascribed to it. *Victimless Leather* is created (grown) by means of tissue engineering, which takes place in a local wet biology laboratory. As mentioned, the use of local resources does not make the procedure easier, and sometimes it becomes more difficult, but it does reduce the costs. However, because of the need to do this locally, the very practical and material bioscientific part of the creation of the object is temporally, spatially, and causally enmeshed with local processes and practices; for instance, legal regulations concerning the kind of material (what cells or tissues, and from what source) that can be used and for what purpose. This is also closely linked to the individual decisions of ethical committees, which give the green light to pursue each project, and its appropriateness for specific venues. Generating a non/living artwork is entwined with economic possibilities, as well as legal and cultural norms, expectations, and narratives.

These cultural norms may become relevant in various ways in the practice of bioart. For example, in the case of *External Ear ¼ Scale*, the human-ear shape of the laboratory-grown living sculpture provoked controversies. Such reactions were linked not only to the initial plan of using human cells (since the humanness usually makes it more problematic for the artists to get a positive decision from ethics committees), but also to the desire to shape the eventual project in the form of a human ear. The artists believe that such responses were related to religious ideas of the sanctity of both the human form and life (Catts and Zurr 2003a). The leather jacket, on the other hand, was adjusted to take a kimono-like shape for the culture of the country in which it was exhibited. Aside from the multiplicity of processes that contribute to the cutting out of the living sculpture from within the assemblage of bioartistic practice, issues such as the material and semiotic boundaries, the beings and meanings of the non/living, the life-worth-living, and of waste are shaped and materialised through ongoing intra-actions between the different components of the bioartistic engagement.

5.1. Wasting Tissues

Making (provisional) cuts between these components takes a specific form if the tissue culture becomes contaminated. In such a case, the most effective biohazardous waste management protocols dictate that the contaminated tissue must be eliminated, provided that the affected material is not otherwise important. If it is deemed useful for other research, the contamination may be treated; however, this procedure is rather ineffective (Mather and Roberts 1998, 126). The processes of intra-action between fungal or bacterial cells (or other infectious organisms) and mammalian cells reshape and modify the dynamic materiality of the tissue culture. In their entanglement with the always outmoded procedures of detection (the chemical tests and microscopes, or in the case of the jacket, even naked-eye observation), the contours of the different organisms hypostatise and become meaningful: the presence of microorganisms is not only recognised as such, but is also framed as an infection that requires an adequate response from the scientists/artists who are taking care of the tissue culture, which – in its contaminated form – carries the potential to become a form of biohazardous waste. From the point of view of the museum, the fungal growth on a living tissue sculpture is unwelcome; it is a contaminant and a form of waste that in the end transforms an artwork into (potentially dangerous) waste and, thus, also affects its ontological status.¹⁸³ Provisional cuts separate the life-worth-living from the living “invader,” life from “waste” and “danger.” These cuts are not final, since, on a superficial reading, the entire assemblage of the infected tissue is teetering on the edge of becoming waste. In fact, one could make the thicker claim that it is always already in the state of becoming-waste, for, even if *the Jacket* had behaved in an ideal way (i.e. it had grown in a manner optimal for the show) it would have eventually turned into a biohazardous material and been killed: either by contamination (for the purpose of the exhibition, as mentioned in Chapter Two, “killing rituals”) followed by neutralisation

¹⁸³ For a discussion on the issues of control and (un)containability in the context of virality and parasitism, see: Cohen 2011.

and incineration, or directly through the use of chemical agents and incineration. Importantly, such a becoming-biohazard does not require any radical change in the biological constitution of the sculpture; rather, it consists of a modification of the dynamics of the bioartistic assemblage: interactions between its components that reshape and stimulate the material and ontological shift in the bioartwork's being (its transition from the status of tissues organised in the form of an art project, into a piece of waste). Bioartistic practices rearrange the inextricable components of the assemblage of the leather jacket, while drawing distinctions (or, making provisional cuts) between the meaningful entities: the "semi-living sculpture," the medium and other elements of the artwork's environment, and the "invader" and "parasite," that is, the fungi. It is bioartistic practices that produce the boundaries: of the jacket ("the worthy life"), the contaminant, the artists (usually seen as the main holders of agency), the curators, and the audience.

5.2. Uncontainable Assemblages

The outgrowth that developed on *Victimless Leather* exposes the two aspects that are central to understanding matter and the non/living in bioart. Firstly, it shows that the boundaries between "welcome" (tissue culture) and "unwelcome" (fungal) life, living and dying, and "making live" and "making die"¹⁸⁴ emerge from within the assemblage of biological art and practice. They are not intrinsically delimited or contained within separate realms; rather, they stabilise as a result of ongoing transformations. The fungi metabolise and take the material space of the tissue of the *Jacket*, while intra-acting with the mammalian

¹⁸⁴ In his analyses of biopolitics, Foucault (1978; 2003) contrasts sovereign power, described as the power "to *take* life and *let* live" (1978, 136), with biopower: "a power to *foster* life or *disallow* it to the point of death" (ibid., 138; see also: Foucault 2003, 247). While in the English translation of his works we find the expressions "to take life" and "to foster life," in the French original it is written *faire mourir* ("make die") and *faire vivre* ("make live") respectively (see: Foucault 1976, 181). Both expressions "make die" and "make live" (directly translated from French) have been adapted by scholars whose work focuses on bio-, necro-, and thanatopolitics.

cells' life functions. The meanings – as much as the physical, chemical, and biological changes in the piece – that are shaped in the assemblage of *Victimless Leather* frame the occurring materialisations as the infection, contamination, illness, and death of the *Jacket*. These dynamic processes of meaning and matter production reveal the illusion of control over life on the one hand, and the enmeshment of material, biochemical processes of multiplication, generation, production, and decay, on the other. The simultaneity of living and dying intertwined and enfleshed in the infected bioartwork expose it as the non/living, where both the living and the non-living coincide in the volume and space of the “dying” artwork. In this way, the *Jacket* illustrates the crucial aspect of life: its processual character. Life is not about static, immutable being, contained within itself, but is rather about transformations and modulations of becoming. The cells of the culture multiply, grow, and metabolise (and therefore excrete), as well as interacting with each other, with the surface onto which they are seeded, and with the contaminants. These processes are not completely separated from one another, nor are the entities (cells, fungi, etc.) that form part of the bioartwork self-enclosed, autonomous individuals.

Throughout Chapters Two and Three, I emphasised the multiplicitous character of life: material forces express themselves in heterogeneous collectives, multiplicities or, in other words, assemblages, the components of which constantly intra- and interact with each other and may connect or affiliate themselves with assemblages and elements external to their initial assemblage. These connections and interactions transform the properties of both the involved multiplicities and their components. As Deleuze and Guattari write, “*a multiplicity is continually transforming itself into a string of other multiplicities, according to its thresholds and doors*” (2004, 275). The tissue of the *Jacket* as a multiplicity of cells – each of which is itself an assemblage of organelles and molecules – interacts with the contaminant: the collective of fungal cells and, perhaps, other microorganisms, which may not only alter the appearance and behaviour of the tissue, but also interfere with the functioning of its cells, such as metabolism, growth, the structure of

membranes, and even chromosomes.¹⁸⁵ “Reaching its threshold” for the tissue of the *Jacket* means that its cells can no longer perform their functions in the same way: their capacities to grow, metabolise, and multiply are altered by the growth and metabolism of the fungi. Thus, to reiterate, what the *Jacket* reveals is that these processes are not isolated or contained within distinct spheres. They are not entirely pre-programmed or determinate. Each component of the assemblage carries its own potentials that unfold and actualise in their encounters with other components, forces, and assemblages. Guattari refers to this aspect of assemblages as “machinism,” which does not equate with “mechanism.” As he writes, machinism “implies a double process – autopoietic-creative and ethical-ontological ... which is utterly foreign to mechanism ... Being does not precede machinic essence: the process precedes the heterogenesis of being” (1995, 108). In other words, assemblages are not arranged by a transcendent force, nor do they follow a prescribed programme; instead, they are expressions of creative, material forces and intensities that “coagulate” in the form of multiplicities, their components, and ongoing processes. Furthermore, the machinic character of assemblages encompasses both processual, heterogeneous multiplicity (the issue of ontology); and connections, relations, interactions, and the ways in which components affect each other (the issue of ethics).

As I noted in Chapter One, assemblages are also characterised by lines of deterritorialisation; that is, a capacity for change, modification, and the undoing of present connections. Deleuze and Guattari’s concept of deterritorialisation thus refers to forces and intensities that take life beyond itself, beyond the containment of established boundaries and relations. If deterritorialisation describes the ways in which forces traverse and transgress boundaries, limitations, thresholds, and containment, then we can say that deterritorialisation expresses itself in excess. It is this potential for excess that renders

¹⁸⁵ Such interferences are associated with the presence of *Mycoplasmas*, which are the most common contaminant in tissue cultures. See: Ryan 2008, 6.

assemblages uncontainable and, thus, illuminates the uncontainability at the heart of an ontology of life that is proposed in this dissertation.

The question of waste and its relation to life that is analysed in this chapter reveals that the notion of excess plays an important role in the ways in which we make (provisional) cuts between “life” and “non-life” and between “life” and “waste.” Along with surplus, the procedure of “cutting” also relies on the idea of value (scientific, economic, etc.). For example, the life of the semi-living sculpture that is excessive (i.e. the fungal infection at Mori Museum, or the outgrowing tissue in the exhibition at MoMA) affects its value (as an artwork that is “supposed to” look a certain way) and subsequently turns the piece into waste. The opposite process is illustrated in the example of tissue economies: excessive biomatter initially deemed waste is ascribed a scientific (and economic) value and, as a result, it is perceived as “life.” Finally, as I have shown in the third section of the present chapter, waste – that which is no longer valued and is excessive (like e-waste and diverse things buried in our landfills) – refuses to remain contained within the set frames: either directly by contaminating soil and ground water (and, thus, leaving the space of a landfill), or indirectly by poisoning the human and nonhuman organisms inhabiting the area where the waste is stored. Life and waste are interlinked with each other through the issue of excess.

5.3. Concluding Remarks

The discussions on waste presented here allow us to recognise not only waste’s relation to life, but also the role of value as a “cutting device” that enables us to make a distinction between things that are deemed to be “life” and things that are deemed to be “waste,” and, thus, help us to comprehend more fully the processes and discourses surrounding the *Jacket*. Bioscience demonstrates that life maintained in a laboratory (for instance, cell cultures) often becomes “wasted” through contamination – that is, interaction – with other entities or substances: it is a multiplicitous process. Simultaneously, the infected artwork – along with the practices of dealing with biomatter in a bioartistic/bioscientific laboratory – reveals the potential for surplus that is always already carried by life: cells and

tissues exceed the discursive and material boundaries of the piece. While theorisations of waste shed light on the processuality and context of *Victimless Leather*, and bioscience reveals the multiplicity of entities and processes that constitute life–waste assemblages, as I have shown above, the artwork itself generates affects that contribute with new insights: by exposing biomatter’s potential for excess, the project emphasises uncontainability as life’s ontological characteristic. When combined, the analysis of TC&A’s *Jacket*, bioscientific insights, and the discussions on waste demonstrate that life and waste are interlinked with each other through excess. Hence, looking at this relationality and the manner in which it influences our understanding of life appears to be a thought-provoking and compelling way to examine the ontology of life as it is exposed through bioart: life that is always already uncontainable.

Conclusion

The gradual cessation of human life on Earth and in the Universe is the beginning of the contemplation of the eternity of life affects, of the life of all ecosophical cosmic interaction.

(Patricia MacCormack 2012, 143)

Biophilosophy, as defined in the Introduction, is a response to, and critique of, the focus on finding life's essence (or, a common denominator of everything deemed "life") and demarcating its boundaries (and those of the living, of bodies, and of species), which is characteristic of the philosophy of biology. Instead, biophilosophy examines the problem of life by cutting across traditional oppositions between the living/non-living, organic/inorganic, and human/nonhuman; it opens up a space for asking about life's potentials, about that which takes life beyond itself, and, finally, about relationalities, connections, and mechanisms of exclusion. In this way, it is also a way to examine life by not taking the human or, by extension, the organic as its starting point and critical lens. Biophilosophy primarily investigates the ontology of life. Yet, as feminist theorists remind us, philosophical domains: ontology, epistemology, ethics, and politics are not entirely independent of one another; if we shift our conception of ontology, it will also have consequences for our understanding of ethics, epistemology, and politics. In this dissertation, I have argued that thinking through bioart – an interference of art, science, and philosophy in a Deleuzoguattarian sense – is a biophilosophical practice that may contribute to a more attentive and nuanced conceptualisation of life than we encounter in mainstream academic discourse.

Understood as an interference, bioart constitutes a plane upon which art borrows methods from science and where philosophy meets its outside: affects and percepts (in other words, intensities and perceptions

that are not ascribed to any particular subject) characteristic of art, and functions specific to science. Following Deleuze and Guattari's theorisation of these three interconnected ways of thinking (philosophy, art, and science), I have suggested that engaging with bioart mobilises philosophical inventiveness: it contributes to the creation of concepts that attend to the problem of life and work through the binary of the living/non-living, organic/inorganic, and human/nonhuman. More specifically, I have proposed the concept of *uncontainable life*, which refers to dynamic, non-teleological, multiplicitous forces and processes of transformation, and intensities that are constitutive of matter and always carry the potential for surplus. These excessive material forces that, I argue, are exposed in the analysed bioartworks, traverse the divide between the living and non-living, organic and inorganic, human and nonhuman, growth and decay, and life and death, as they are traditionally comprehended. In other words, uncontainable life can be described by three factors that I have examined in Chapters Two, Three, and Four – namely: 1) the processual enmeshment of living and non-living, organic and inorganic, and life and death, that I call *the non/living*; 2) life's multiplicitous character: life expresses itself in assemblages of components and forces that are modulated through their connections and interactions with each other; and 3) the potential for excess, carried by forces of the non/living that enable them to surpass prescribed material and conceptual boundaries.

In this thesis, I have concentrated on an ontology of life that is not only revealed through the analysed bioartworks, but also strives to attend to processes and entities described by science as not conforming to the traditional understanding of life, such as viruses, prions, viroids, or synthetic and inorganic protocells. Furthermore, such an ontology of life also seeks to account for material forces, the potential of which is not limited to their actualisation in the form of synthesis: to repeat after Colebrook, when extended, these differential forces have the capacity to destroy the bounded organism. An example of this is cancer: it induces the abnormal growth of tissues (cancerous cells are characterised by a limitless replicative potential and the avoidance of apoptosis,

programmed cell death); it may metastasise (i.e., spread to other parts of the body) and lead to the death of the organism. In this way, the acceleration of (life) forces expressed through the outgrowth of cancerous tissues is entwined with the death of the body. An ontology of uncontainable life is inspired by Colebrook's reading of passive vitalism, in which there is no divide between matter and force; matter is constituted through differential, creative, and machinic forces that may actualise (or express themselves) in the form of bounded organisms. Yet, they also exceed the boundaries of organs and organisms, and may lead to division and destruction. According to Colebrook, in Deleuze's work, these differential and expressive forces are equated with life. Such a philosophical perspective is also supported by a physical understanding of matter as diverse and non-inert multiplicity, constituted through the mediation and interaction of forces that bind particles together. In order to summarise my many points, I shall briefly revisit not only the ways in which the selected and analysed projects – the semi-living sculptures created by TC&A and the performance *May the Horse Live in Me* by AOO – contribute to a less anthropocentric conceptualisation of ontology, but also how they inscribe themselves in the speciesist and anthropocentric power differentials that form part of the traditional understanding of life. Furthermore, as I noted in the Introduction, my hope is that such a rethinking of the ontology of life may form the foundations for a future non-anthropocentric and non-speciesist reconceptualisation of ethics.

1. The Non/living of Tissue Sculptures

TC&A's sculptures, which consist of tissue cultures (often of hybrid character, as in the case of *Victimless Leather*) grown on biopolymer scaffoldings, and the practices of exhibiting and caring for the artworks challenge the conventional idea of life as pertaining to bounded organisms. The cells and tissues used by TC&A – like any tissue cultures used in bioscientific research – are grown under laboratory conditions specific to this purpose. As I noted in Chapter Four, there are companies

specialised in the “manufacturing” of such biological materials. Taking into account the sheer quantity of these laboratory-grown lifeforms (on a worldwide scale), TC&A asks what kind of language we should use to describe such biological matter, which is non-classifiable in terms of traditional taxonomies. The answer that the artists provisionally offer is their term: “semi-living.” TC&A applies this notion to their artworks for at least two reasons. Firstly, the sculptures contain living biological material: the tissue, and an artificial element: the polymer scaffolding, onto which the tissue is seeded. Secondly, the tissue cultures used in TC&A’s projects and, therefore, the sculptures themselves (just like any form of laboratory-grown life) require constant technological support: sterile conditions, the provision of nutrients and antibiotics, and cleaning (the removal of metabolic waste produced by the tissues). By extension, TC&A sees all life maintained through technological means in bioscientific laboratories as semi-living: the entwinement of the organic and inorganic and the natural and artificial. Their category of the semi-living is strictly applied to laboratory-grown life and limited to such bioartistic and bioscientific contexts. In this way, TC&A’s semi-living does not equate with the non/living; however, it can be understood as taking part in the non/living.

TC&A’s sculptures expose life as the enmeshment of processes of living and dying, composition and disintegration, and growth and decay. Contaminated with microorganisms (whether an infection is induced intentionally – by removing the tissues from sterile containers – or incidentally), these sculptures are a playground where bacteria, fungi, and other microbes thrive, while the tissue decays and dies. Death and life, as they are revealed in TC&A’s artworks, are not distinct moments isolated from one another; instead, they are material processes of transformation that overlap in space and time: the multiplication and growth of the contaminants is intertwined with the degeneration and dying of the tissue. Such an entwinement of the processes of synthesis and decay is not limited to TC&A’s artworks. Rather, the sculptures expose the processual enmeshment that constitutes the non/living. Apoptosis forms a crucial

part of the development and functioning of multicellular organisms:¹⁸⁶ it is due to massive cell death that the spade-like structures in a mouse embryo become shaped into paws; similarly, in the developing vertebrate nervous system, over half of the nerve cells die soon after they are formed (Alberts, et al. 2015, 1021–1022).

Both TC&A's artworks and bioscience, broadly speaking, demonstrate that living and non-living and life and death are neither contained in separate "boxes," nor containable. Instead, these processes are the expressions of forces that exceed individual bodies and challenge the common understanding of bodily boundaries by revealing their fluidity and blurriness. Furthermore, they also show that the distinctions we draw between bodies and processes are provisional "cuts" that temporarily separate these entities and processes from one another, and are context-dependent. In this way, the non/living is radically immanent: there is no external force that rearranges it or establishes borders within it. The processuality (or, in other words, becoming) that characterises the non/living produces nothing other than itself.

As I have already mentioned, the artists often emphasise that one of their aims is to initiate or at least contribute to ethical discussions on the use of living substances by bioscience and biotechnology. More specifically, they critique the approach that treats life as a "raw material," which they associate with the "engineering mindset," on the one hand, and the more general hypocrisy in our treatment of life, on the other. At the same time – and TC&A is open about this – their own practices do not undo the mechanisms of exploitation of the nonhuman: they employ the same tools, materials, and operations as scientists and bioengineers; their practices are performed by humans who hold a certain power over the tissues, which they manipulate. The difference, they claim, lies in the

¹⁸⁶ As Alberts, et al. note, apoptosis is an efficient process, in which "the cell dies neatly and is rapidly cleared away, without causing a damaging inflammatory response" (2015, 1021). In general, cell death occurs in many organisms, but apoptosis is primarily characteristic of animals. Another example of cell death is the process called "necrosis," in which cells die "in response to an acute insult, such as trauma or a lack of blood supply." In necrosis, cells "swell and burst, spilling their contents over their neighbors and eliciting an inflammatory response" (ibid.).

questions they pose. By proposing and realising absurd scenarios – as in the case of *DIY De-victimiser Kit*, in which the cells from a killed animal are “brought back to life” in order to give comfort to the consciences of the people responsible for the animal’s death – the artists reveal how human exceptionalism forms the starting point of our approach to other organisms and “bits of life.” TC&A’s artworks expose the processuality and uncontainability of life and, thus, contribute to thinking ontology anew. In this way, they also demonstrate the need to re-imagine our relation towards the non/living (and hence, to re-imagine ethics), but without giving further hints about ways in which this could be done.

2. Transspecies Multiplicities

The second aspect that describes uncontainable life (along with its processual enmeshment as the non/living) is its multiplicitous character. To reiterate, life expresses itself in assemblages: heterogeneous multiplicities of elements that affect each other, form alliances and connections, and are modified through these connections. Components of an assemblage may relate to elements that are external to this specific multiplicity and, thus, enter other assemblages. Deleuze and Guattari emphasise that the elements of an assemblage do not have fixed, immutable properties; rather, these properties are always influenced and shaped by the “in-between,” that is, by the connections they form within a particular assemblage. In Chapter Three, I argued that AOO’s project *May the Horse Live in Me* exposes and amplifies the transspecies and multiplicitous character of embodiment. In this project, the body of one of the artists is injected with equine blood plasma: over time and via the practices of mithridatism, her body adjusts to the presence of foreign immunoglobulins and her immunological response is much less acute than might have been expected. As I have emphasised, the transspecies connection demonstrated in this project should not be seen as something radical or completely new; rather, the performance works as a lens that reveals the transspecies multiplicity which lies at the heart of both human and nonhuman embodiments. Contemporary genetics, cell biology, and

the research on microbiomes, among other areas of bioscience, provide numerous examples of such a transspecies constitution of the body.

AOO's project exposes bodies as transspecies collectives, which intra- and interact with one another and exhibit fluid and mutable boundaries. In this context, life appears not to be containable within the frames of a species or of an individual body. At the same time, the project is deeply invested in the cultural imaginaries of human/nonhuman relations: on the one hand, the artists speak about their fascination with mythologies and other stories concerned with this issue; on the other, they repeat popular tropes of the anthropomorphisation of nonhumans and biological processes, as well as the cultural meanings ascribed to them (as in the case of their description of the "battle" between the cells). The artists do not necessarily acknowledge how deeply *May the Horse Live in Me* is rooted in the history of the use and abuse of nonhuman animals in medicine and science. The Horse, that is, the other with which Laval-Jeantet wishes to meet and interact on a subdermal level, is reduced to anonymous equine immunoglobulins and, thus, to an object rather than a subject in the encounter. AOO's project shows that – despite the artists' declarations – their undertaking reinscribes itself in the mechanisms of exploitation of nonhuman animals by humans.

In her work on posthuman ethics, Patricia MacCormack (2012) emphasises that the exploitation of nonhumans in the sense of both the enslavement of their bodies and the epistemological exploitation of the animal is directly linked to the parasitic position of the human, as explained by Michel Serres:

The tree and cow told us that man never returned or recognised the gifts of flora and fauna. He uses and abuses them but does not exchange with them. He gives food to the animals you say. Yes sir he gives the flora to the fauna, fauna to the fauna ... what does he give of himself? Does he give himself to be eaten? The one who does so will utter a timeless word. One word, *host*. (Serres 2007, 82, cited in: MacCormack 2012, 76)

In this context, MacCormack argues, becoming a host means that one moves from the position of the "parasitic human" to the stage of "human

absence.” This may also be understood as “ethical grace as making available beyond the other’s availability” (ibid., 76). Being a host implies letting the other be without any condition or requirement of reciprocity. Although Laval-Jeantet claims that she wishes to give her body to the nonhuman other (and by doing this, she also leaves the comfort zone of “full” control over her bodily reactions), it is this reciprocity, that is, the effect of equine immunoglobulins on her organism, that she is expecting. This is also why AOO’s performance as such is equivocal: on the one hand, it exposes the transspecies multiplicity of both human and nonhuman embodiment, and thus contributes to a less anthropocentric understanding of ontology and human/nonhuman relationality; on the other, it reinstates the position of the “parasitic human,” who exercises his/her power over nonhuman bodies.

3. Uncontainable life and the question of ethics

What is revealed through both TC&A’s semi-living sculptures and AOO’s performance is the potential for surplus carried by life. TC&A’s bioengineered sculptures show that material transformations exceed the prescribed frames: as I have already emphasised, living and non-living, growth and disintegration are not segregated into separate domains; rather, they are intertwined with each other as the non/living. They involve multiplicities of cells and other elements that are affected and modified through the intra- and interactions within the assemblage of the semi-living sculpture. *May the Horse Live in Me* also illustrates the potential for excess that is so characteristic of life, which exceeds individual bodies (like the bodies of the horses from which the blood used in AOO’s performance was taken) and species. In Chapter Four, I looked at one of the exhibitions at which TC&A exhibited their project *Victimless Leather*. During the exhibition, the sculpture in the shape of a miniature jacket became infected with fungi, which resulted in a visible excrescence. Those who interfere in biological substance – bioartists, scientists, and engineers – aim to exert control over the non/living; yet, it is the potential for excess that leads the non/living to actualise in ways

that do not always conform to the expectations and scenarios planned by the experimenters or the audience.

Furthermore, the surplus of the non/living in the bioscientific laboratory is interrelated with the issue of waste: the non/living that is no longer needed, such as superfluous or already “used” tissue cultures, cells, and microorganisms, is immediately categorised as biohazardous waste and, as such, requires adequate procedures of neutralisation. The examples discussed in Chapter Four: everyday practices in a bioart laboratory, tissue economies, the production of electronic waste, and the practices of disposal of industrial waste, show that the issues of life, waste, and value are closely intertwined. In the context of a biolab, the non/living that is no longer considered valuable in scientific (or artistic, or economic) terms becomes waste, like tissue sculptures once the exhibition in which they are shown is over. Meanwhile, Waldby and Mitchell present the reverse situation: they analyse how bodily matter that had been considered waste – like umbilical cord blood and the spleen surgically removed from John Moore’s body – appeared to be the source of materials that are valuable in a biomedical and economic sense. Umbilical cord blood is a source of pluripotent stem cells, which are used in the treatment of blood and immune-system-related genetic diseases. Moore’s spleen was used by the researchers to develop and subsequently patent the “Mo” cell line (a T-lymphocyte cell line that contains a replication competent Human T Cell Leukaemia Virus) used in cancer research. In this way, the non/living removed from the “host” body is first described as biohazardous waste (often shapeless matter that is no longer contained within the boundaries of the body); subsequently, it is ascribed a biomedical and, later, economic value, and is thus returned to the status of life and precious biomaterial. Minerals employed in the production of electronic devices are resourced amidst the struggles of life and death, violence, and war in the Democratic Republic of Congo. Once used and “outdated,” these electronic devices “end their lives” as e-trash in landfills often located in the global south, and thus generate further struggles of life and death by poisoning human and nonhuman bodily materialities. In their investigation of Canada’s management of nuclear,

industrial, and communal waste, Hird and her collaborators focus on the issue of environmental justice: on the moving of waste out of sight (and memory), which, in fact, is about the question of who has the privilege not to see or be affected by the waste. The landfills analysed by Hird are also the dwellings for microorganisms which, in their metabolic processes, produce gases that are toxic to the humans and nonhumans living in the areas surrounding the landfills. In most of these cases, the notion of value (economic, scientific, biomedical) works like a provisional cut that makes an incision dividing “waste” from “life.” However, what these examples also show is that neither of the two realms is containable: life pours into waste and waste rearranges itself into life.

The question of life has been prominent since the inception of philosophy, due not only to its ontological significance, but also to its importance as a possible foundation or point of reference for ethics and morality. Plato and those who came after him talk about ethics by posing the question: what is the good life? Yet, as I emphasised in the Introduction, since the beginning of Western thought, there have been internal disagreements and inconsistencies in the evaluation of what counts as life and in what ways. In other words, conceptualising life has often been followed by reflections on which lives matter and which lives are considered mere and “*worth less than*” (Braidotti 1994, 147) matter. The Aristotelian distinction between the life of citizens: *bios*, and vegetative life (ascribed to plants, animals, and people not considered citizens of the *polis*): *zoe*, as it is discussed by both Arendt and Agamben, implies a difference in the evaluation and treatment of these types of life (the life of a citizen counts for more than the life of a woman, a slave, or a horse). It has also been preserved in one way or another in cultural, ethical, and political approaches to the question of life, which have more often than not resulted in discrimination and violence against those whose lives are seen as “*worth less than*,” leading to exploitation, abuse and suffering. It is this distinction that has contributed to the bias which underlies the majority of Western ethical theories (both those labelled “deontological” ethics (focused on intentions and the act itself) and “consequentialist” ethics (focused on the consequences of the act)):

whenever they are concerned with an obligation towards the other, most of them concentrate exclusively on the other of a human kind. Yet, as the histories of sexism, racism, colonialism, classism, and other forms of oppression teach us, the idea of who counts as human has not always been clear and this has served as a legitimisation for discrimination and violence against those who have not qualified as “human enough.” Although contemporary ethics look beyond human life – environmental and animal ethics¹⁸⁷ are concerned with nonhumans – they often do so by preserving human exceptionalism: for example, conservationists underline the importance of protecting the natural world, while foregrounding the interests of future human generations (and, thus, human life); and proponents of the animal welfare perspective accept the exploitation of nonhuman animals for human profit provided that animal suffering is minimised.

In Chapter Two, I mentioned Venter and his team’s research on the microbiome and their success in creating the first self-replicating synthetic bacterial cell. This and similar undertakings do not necessarily undermine the central position of the human either: instead, this research is predicated upon ideas of the uniqueness, survival, and future of the human species in the context of diminishing natural resources and ecological disasters caused by the human species itself. Similar themes based upon the logic of human exceptionalism drive the currently popular discussions on the “Anthropocene,” defined as the current geological epoch influenced or, rather, generated by “human activities on earth and atmosphere, and at all, including global, scales” (Crutzen and Stoermer

¹⁸⁷ Ethical approaches to nonhuman animals can be broadly divided into two tendencies: animal rights (perspectives which hold that “human utilization of nonhuman animals, whether in the laboratory, on the farm, or in the wild, is wrong in principle and should be abolished in practice” (Bekoff and Meaney 1998, 42)) and animal welfare (views which hold “that humans do nothing wrong when they use nonhuman animals in research, raise them to be sold as food, and hunt or trap them for sport or profit if the overall benefits of engaging in these activities outweigh the harms these animals endure. Welfarists ask that animals not be caused any unnecessary pain and that they be treated humanely” (ibid.)).

2000, 17). Although the term “Anthropocene” has been used by scientists since the 1980s in various forms (for example, “Homogenoscene,” “Anthrocene,” and “Anthroposphere” (Schneiderman 2015, 180)), it was officially proposed in 2000 by Paul J. Crutzen and Eugene F. Stoermer, who associate the beginning of this new geological time period with the eighteenth century and the Industrial Revolution. While geoscientists are still debating whether or not the geological, biological, and chemical evidence legitimises the introduction of a new epoch, as Jill S. Schneiderman argues, “it would be perverse to counter the assertion that the activity of human beings, though geologically recent, has induced intense global-scale changes” (2015, 197). The notion of the Anthropocene has drawn the attention of theorists and scientists from a number of disciplines beyond geoscience, who also point to the problematic carried by the name itself: its “self-centeredness ... and ... ignorance of intersecting systems of oppression” (ibid.). In other words, it lifts the human to the privileged position of an autonomous agent who has the capacity and power to change the earth and whose activity has initiated a new epoch, while simultaneously erasing the differences between human populations, who do not have an equal share in affecting the planet. That is also why Schneiderman (similarly to other scholars critical of the term) asks: “why choose *anthropos* (Greek for human) as the namesake of a new epoch of geologic time? What do we obscure and what do we privilege with such a choice?” (ibid., 185). Furthermore, as she notes, some critics of the Anthropocene suggest that perhaps the term should be used rather as the name for “an epoch of *human*, not geological, history marked by calendars and cultures, not stratigraphic units” (ibid., 195).

While discussions on the Anthropocene taking place beyond geoscience are primarily concerned with political and economic questions about science, technology, and the environment, theorists also ask about ethics that could account for the place of life and the human in

the age of the Anthropocene.¹⁸⁸ Yet, looking from a perspective that does not place the human at the centre – as this dissertation strives to do – one may pose two interconnected questions: firstly, does the survival of the human species (as we know it) provide any benefit to the Earth? Secondly, can a rethinking of life that does not employ the human or, by extension, the organic, as its blueprint, contribute to or mobilise ethics (understood as ways of connecting, relating, and affecting) that would truly evade the straightjacket of human exceptionalism and, hence, speciesism?

Concerning the first question, some scholars loosely associated with the tradition of Deleuzian feminism suggest that, perhaps, it is the other way around: the limitation of human impact and, eventually, human extinction would allow other forms of the non/living to flourish. As MacCormack emphasises, “The absence of the human is the most vital living yet to be accomplished: it is life lived as life” (2014, 184). In her theorisation of posthuman or, more precisely, “ahuman” ethics,¹⁸⁹ it is only by doing away with human subjectivity (without replacing it with a substitute) and human life “as we know it” that other, more gracious modes of relating, connecting, and expressing may be mobilised: “Silencing human speech opens a harmonious cacophony of polyvocalities imperceptible to human understanding, just as human speech has a detrimental effect of silencing unheard, unthought expression” (ibid., 182). In other words, MacCormack’s ahuman ethics requires that the understanding of life upon which it relies should no longer be confined to the frames of autonomous individuals and distinct, orderly processes that are but refractions through the human prism. Her formulation of ethics: “indescribable relations and connectivities seeking, in secret and silence and invisibility, and never arriving at the sought” (2012, 147), is based on life defined as “a connective consistency, not my, one or human life” (ibid., 144) that is also “real, singular and ... uniquely emergent without predictable development” (ibid., 4). While

¹⁸⁸ See for example: Zylinska 2014; Clark 2015; Gibson, Rose, and Fincher 2015; and Pattberg and Zelli 2016.

¹⁸⁹ See also: MacCormack 2012.

MacCormack primarily focuses on ethics, her Deleuze- and Spinoza-influenced description of life converges with some of the characteristics of uncontainable life proposed in this dissertation. Furthermore, MacCormack argues for ahuman ethics as an abolitionist project, inspired by both Serres' concept of "grace," defined as "stepping aside," "giving up one's place" (MacCormack 2012, 58), and the abolitionist approach to animal rights, which rejects all use of nonhuman animals and is based on the principle that "all sentient beings, humans or nonhumans, have one right: the basic right not to be treated as the property of others" (Francione and Charlton 2012, n.p.).¹⁹⁰

MacCormack's argument for abolitionist ahuman ethics that "are only truly possible if we are not here" (2014, 183) and, thus, when life is no longer shaped in a human way, may be paralleled by Colebrook's investigation of an ethics of extinction:

In relation to the human one might ask whether modes of living and modes of relation could exist without the assumption of a "we," and without the assumption that "we" are worthy of living on; one might ask whether the future should not be saved for another mode of life altogether. (Colebrook 2014b, 148)

In other words, Colebrook asks whether questions about the annihilation and extinction of the human species arising as a result of the discussions on the Anthropocene may "*destroy* the subject or humanity as we know it" (ibid.) and, subsequently, encourage the consideration of other modes of relating and connecting, not premised on the human subject and human life. Thus, both MacCormack and Colebrook ask about ethics "after life," each of them demonstrating that a non-anthropocentric and more emancipatory ethics cannot rely on an ontology of life conceived through the human prism (or, life "as we know it"). It is only by reimagining a different starting point: an ontology which takes life beyond fixed binary categories and stable boundaries, that an ethics which is attentive to the multiplicitous differences of the non/living and truly creative may be

¹⁹⁰ I also briefly discuss this aspect of MacCormack's approach in: Henriksen and Radomska 2015.

mobilised. Along with MacCormack and Colebrook, Weinstein also offers a conceptualisation of ethics that can unfold only when life is no longer understood in a traditional, humanistic (and – as she emphasises – organicist) way. She argues for an in/difference ethics that is:

constituted by creative acts and expedient decisions, incommensurable determinations of what matters, and the inhuman forces and affects of the posthumous assemblage. The act or decision is a materialized force within the assemblage of an ethical event, an affective and relational encounter that does not take identity, or life in its humanistic forms, as preceding the event and erected upon a background of pure ontological difference. (2016)

In this way, she grounds her formulation of ethics in the Deleuzian concept of difference: the processes of differing and pure potentiality that never refer back to an identity or an original. Thus understood, difference is also constitutive of her notion of “posthumous life”: life after “the death of life (as we know it)” (Weinstein, forthcoming), which I discussed briefly in Chapter Two.

All three of the above-mentioned enquiries into genuinely innovative and emancipatory ethics acknowledge and emphasise the need for an approach to life that goes beyond the straightjacket of Enlightenment Humanism and speciesism. And all of them find inspiration in the robust neovitalism of Deleuze and Guattari. And, to varying degrees, each of them addresses the three factors that I bring together into what I am calling an ontology of uncontainable life. The concept of uncontainable life, which is created within the interference between philosophy, science, and bioart (and, thus, is informed by other concepts, functions, and sensations), recognises three aspects of life that challenge the structures of the humanistic understanding of life and simultaneously open up a space for imagining different, more emancipatory, creative, and expressive modes of connecting and interacting: the non/living, the multiplicitous character of life, and the potential for surplus. As I argued in Chapter Two, what we deem as living and non-living, organic and inorganic, are material, differential processes enmeshed with each other. Hence, a more fruitful approach is to see these processes as the

non/living, as revealed in TC&A's projects; for example, *DIY DVK 01*. In Chapter Three, I have demonstrated that life equates with multiplicitous, material forces that express themselves in the form of assemblages, such as the transspecies assemblages of human and nonhuman embodiments that feature in AOO's performance *May the Horse Live in Me*. Finally, these differential and material forces and processes of the non/living always carry the potential for excess: they exceed the boundaries of bodies, multiplicities, and concepts within which we try to contain them, as I have shown in my analyses of life-waste assemblages and the contaminated *Victimless Leather* piece, in Chapter Four.

Doing biophilosophy through bioart involves stepping out of the comfort zones of discrete disciplines and engaging in the interference between philosophy and art, where affects and sensations contribute to the creation of concepts and concepts mobilise affects. Such an undertaking does not erase difficulties, problems, or gaps: as Deleuze writes, "A creator who isn't grabbed around the throat by a set of impossibilities is no creator" (1995, 133). Yet, it is precisely this discomfort and tension that open up a space for the invention of new ways of comprehending life's potentials and the creation of intensities and concepts that are more adequate to deal with the problem of life than traditional, humanistic understandings. While the bioart projects examined in this thesis consist by definition of biological substance, they also reveal that life is not exhausted by organic matter and the processes of synthesis. The analysed artworks expose in a fleshy manner the processual, differential, and material enmeshment of the non/living, its multiplicitous messiness, and the potential for surplus that compels material forces to spill over the boundaries of bodies and conceptual frames, thus always already virtually evading human control. The interference of philosophy, science, and art proposed in this thesis mobilises an ontology of uncontainable life – life that is no longer moulded into a human form or constrained by our conceptual habits and binary categories – which, I believe, may contribute to the creation of different, more attentive, and less oppressive modes of relating.

As I demonstrate in this thesis, biophilosophy – performed in the encounter between philosophy, science, and art – generates a critique of the traditional humanistic understanding of life. The analysed bioart projects work as a catalyst: in their interference with bioscientific notions and Deleuzian feminist philosophy, bioartworks expose life's uncontainability. TC&A's sculptures and the accompanying procedures of caring for and "killing" the artworks reveal the processual enmeshment between the organic and inorganic, living and non-living, growth and decay, expressed in the concept of the non/living. AOO's performance *May the Horse Live in Me* draws attention to the transspecies character of both human and nonhuman bodies. In this way, the project demonstrates that life is not framed by fixed, impermeable boundaries; instead, it is always already expressed in assemblages of various entities and processes. While both the blurred boundaries between the living and non-living, and the multiplicitous character of life already point to excess as a key property of life – as I have shown above – it is in the contaminated *Victimless Leather* piece and the problematics of (biohazardous) waste that life's potential for excess takes centre stage. These three aspects render life uncontainable and prompt us not only to ask what it means to our being/becoming, but also to imagine a different, more hopeful future.

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