WHEN CRISPR MEETS ART

THE EXPERIENCE OF RELATIONALITY THROUGH THE AFFECTIVE AGENCY OF MATTER

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INTRODUCTION

In 2012 a new technique called CRISPR, short for Clustered Regularly Interspersed Short Palindromic Repeats, was introduced in the biotechnological industry.[1] It was intended for the localization of genes to cut out of genomes and break them down permanently, or to replace genes with ones that the organism didn't possess naturally. Such a construction and disposal of genetic sequences that encode for certain abilities, disabilities, advantages or diseases could not only change the organism itself or its immediate offspring, but could even, through an additional technique called gene dive, permanently alter whole populations.[2] This kind of modification of genomes was not new in the biotechnological field, other techniques such as Zinc finger nucleases already had been put in practice for years, but CRISPR was received with a striking amount of commotion because it appeared to be much cheaper, quicker and easier to use compared to previous methods.[3] Consequently, in the following years the technique became rapidly adopted in the multiple branches of the Life Sciences. Now we can see that researchers improved it in such a way that the error rate has declined drastically and that it already has been applied on a multitude of organisms, such as malaria mosquitoes and even human embryos.[4]

Because of the seemingly ease to experiment with DNA and because the technique can be adopted by various groups of people, from experts to students to even hobbyists, a lively ethical debate is set in motion.[5] The proponents of the wide adoption of CRISPR consider the technique as the solution for the many medical problems we face this day, but there also exists a reluctant group of researchers who mostly worry about the rise of unknown consequences, varying from technical implications to disturbances of the biosphere.[6] The most heat, however, is about the altering of the human 'master molecule' and its effect on the existence of the Homo sapiens. This technical controversy is simply the latest chapter in the debate on the changing of humanity in (bio)technological times that has

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[1] CRISPR has often been called CRISPR-Cas9 because it started out as a technique in which the RNA-guided nuclease Cas9 was used, but since other nucleases like Cpf1 have been discovered and applied as well, for this thesis I will refer to the genome editing technologies by the umbrella term CRISPR.
[2] Ledford 2015b, 22.
[3] Ledford 2015b, 20.
[4] For the error rate decline, see Ledford, Web. 31 May 2016 <http://www.nature.com/news/enzyme-tweak-boosts-precision-of-crispr-genome-edits-1.19114>. For the debate on genetic modification of malaria mosquitoes, see Ledford 2015b, 22. For genetic modification of human embryos, see Cyranoski 2015, 593.
[5] Cyranoski 2015 and Center for Genetics and Society/Friends of the Earth, Web. 5 Jan. 2015 <http://www.geneticsandsociety.org/downloads/Human_Future.pdf>.
[6] Ledford 2015b, 21.

been actively discussed since the last decades of the previous century. With this issue not only scientists and bioethicists are associated, but also sociologists, philosophers, politicians and citizens are taking in various standpoints in the discussion of human change and radical enhancement, the non-medical design of human DNA. For instance, there are those who share the more conservationist belief that humanity has a fixed core that should be preserved and protected: fearing the fusion of technology with biology might lead to the end of humanity. In contrast to this, other parties have the opinion that human essence is flexible, and accepts or even welcomes the creation of the technologically enhanced posthuman or transhuman. Now, in the twenty-first century, the debate has not changed much in its core and it appears to be impossible to reach a consensus on the contested subject. New developments like CRISPR, however, confront us with the inevitability of technology's footprint, and demand new methods for both experts and laymen to be able to deal with this difficult but essential subject matter.

In the field of art and culture the subject of human nature and its relation to biotechnology is hot topic as well. Since the 1990s, artworks referring to and consisting of techniques and materials from the Life Sciences are developed by those called bioartists, a group of experimental creators who aim to construct a better understanding of the ethical, social and philosophical implications of biotechnology.[7] They do so by means of their own research and artistic expression, while often collaborating with specialists from scientific fields to achieve their goals. Because the artists usually don't have to deal with the pragmatic specifics scientists are led by in an environment that heavily relies on governmental funding, they have the freedom to do experiments that can be considered unconventional, unpractical or simply weird. In this way, bioartists are considered the kind of researchers that can provide new experiences and unpredictable implications to a wide public that extends beyond the biotechnological realm.[8] All in all, bioart is famous for its ability to bring about in its audiences instances such as shock, disgust or fascination when confronted with the life material and how these notions bring us in contact with intrinsic perceptions we weren't aware of beforehand.

Yet one can wonder how these bioartists, often dealing with a long-lasting work

[7]Although the bioart movement exists for more than twenty years now, the precise definition of the art form is still heavily debated. Because in my thesis the focus lies on the general epistemological practices of art, I will not discuss the particulars of what to include or exclude in the term bioart. Instead I will use the term bioartists in reference to creative makers who mainly produce artistic and experimental pieces in which practices and concepts from the Life Sciences are centralized.

[8] Lestel 2007, 158.

process, can keep up with the fast moving pace of scientific developments; sometimes new techniques like CRISPR trigger such a popular reception that they already have been applied to contested subject matters before the artists even have the chance to reflect on its bioethical significance. Nonetheless, technical specifics aside, the dilemmas that are inherent in the domain of CRISPR are themes that have been actively put forth by bioartists working with other biotechnological practices before. Their art therefore still appears to contain qualities that can be of importance in the discussion of the scientific avant-garde. That is why I would like to focus on a selection of already existing bioartworks, and see which themes come forth and which insights might be of use in the issue of CRISPR. The main question that will structure my argument of the importance of bioart is thus how bioart can provide a framework for the discussion on genetic enhancement concerned with human nature that is sparked by the new genome-engineering technique called CRISPR. I understand this framework to be a selection of insights that are triggered by an interactive set of bioart confrontations, which will provide a new way of dealing with the opposing views that colour the contemporary bioethical debate.

What constitutes these opposing views has to be established first. Therefore I will start my discussion with a selection of texts that are written by some well-known advocates in the human enhancement debate, such as Francis Fukuyama, Nicholas Agar, Nick Bostrom, Rosi Braidotti and John Harris. In this first chapter I will look at the fundamental points they make that are of importance in the evident inability to reach consensus. By doing so, I will highlight the forces that drive their point of views, and make clear that exactly these issues all find their place in the illuminating experiments of bioartists.

After establishing this, I will discuss in the second chapter what I think stands at the core of CRISPR's popularity. For this we will have to dive into the internal drives that make us so susceptible to CRISPR's promise. Because of the surprising easiness of the technology, the slow but cautious pace of genetic engineering has all of the sudden turned into a marathon of different competing researchers and companies, all trying to see their long-term plans prematurely realized. What previously was deemed as hard to achieve, something that might take years of research and careful planning, appears now to be within reach, resulting in the thinking about bigger steps to a future that until recently solely seemed possible for future generations. With new possibilities, a new eagerness for further improvement is constructed. And when almost everything seems possible, we will have to address the question what is it what we actually want. Do we all have one specific objective, one goal, or is what actually is at play here the experience, the mechanisms of desire itself

that should be investigated? Artist Stelarc addresses the desires of technological improvement of the human body with the statement that the body is obsolete. I will discuss his *Ear on Arm* project (2003-2012) to exemplify how art can affect an audience in such a manner they can experience a relational core of being, which will prove to be an essential part of the mechanisms of desire. I will use Brian Massumi's affect theory as theoretical framework, and show how this will bring us to the sensational aspect of art that links to the sexual desires as conceptualized by Georges Bataille. This is of importance when I will introduce the artwork *MicroSushi, Microinjection Food Science* (2010) by Adam Zaretsky to discuss the presence of sexual desires in the motivations of genetic research.

As a next step I will shift my focus on the communal impact of CRISPR. As it happens, in 2015 already some articles commented on the possibility of ordering the supplies needed for the method online, and by now in 2016 different ways to access the technique, such as a crowd funding campaign aiming for the public accommodation of designing with DNA, have been brought about.[9] Such activities led to a rising concern among scientists, because they believe that it will lead to "unexpected and undesirable outcomes".[10] Whether these outcomes indeed will be negative or instead positive, CRISPR will in any case influence the way people can perform scientific experiments themselves, and since the human can genetically be understood as a connected being, these experiments will also influence the subjectivity of others. What the CRISPR technique thus might do to the connected self in society and how art can help to get a grasp on this significance stands at the core of my third chapter. For this I will first look at Revital Cohen's *Genetic Heirloom* series, to discuss the genetic connection between people and how this influences cultural ideas about relationality. Michel Serres' theory of parasitic disruption of harmonious systems proves itself to be of importance in this discussion to show the construction of these ideas about who we are and how we relate, and this is also what will provide insights on the significance of do-it-yourself biotechnology on scientific discourses. The collaborative project *Cult of the New Eve* between Critical Art Ensemble, Paul Vanouse and Faith Wilding shall for that matter function as an entrance to the importance of the break from within.

In the debate on human enhancement the biggest point of friction is however the

[9] On do-it-yourself experiments with CRISPR, see Ledford 2015a and Vezina, Web. 7 Feb. 2016 <https://www.technologyreview.com/s/543491/now-you-can-genetically-engineer-living-cells-with-a-home-kit-should-you/>. On crowd funded CRISPR kits, see Zayner, Web. 7 Feb. 2016 <https://www.indiegogo.com/projects/diy-crispr-kits-learn-modern-science-by-doing#/>.
[10] Ledford 2015b, 24.

question where all these enhancement technologies will lead to.[11] What will we become when we in fact will use the possibilities that CRISPR provides us? For my last chapter I will thus look at the philosophical implication of the posthuman. For this, the artworks of Kathy High, *Embracing Animal*, and of Eduardo Kac, *Natural History of the Enigma*, shall make clear that the posthuman can also be discussed as something that is not rooted for or argued against, but as a heuristic technique. Both these projects cross over the limitations of human identification and show for that reason how matter itself can act as an active agent in the construction of subjectivity. In this discussion the theories of Rosi Braidotti, Andrew Lapworth and Karen Barad will lay the groundwork that is needed to understand the upmost importance of art's inclusion in the theoretical attempts to understand the hypothetical CRISPR'ed human.

Because language and experience are two distinct knowledge-producing discourses, and because this thesis itself is a theoretical discussion of art's practical workings, when I refer to the effect of art I will do so in a descriptive manner that cannot be exchanged for its actual significance. The person reading this will thus have to keep in mind that the discussed artworks shall always tell more than the 17.000+ words written on this set of papers. However, the importance of this research should be understood as a guideline to what happens in the confrontation with an affective bioart piece. It mostly is thus an argument for the place of art in a world that is filled with pragmatic and defining scientific establishments. It shall show that art makes room for notions that are otherwise considered subjective or counterproductive, such as emotion and confusion, and will make clear that they cannot be excluded but instead should be embraced in the discussion of human nature. Only then shall we be able to understand a future in which the presence of life changing technologies stand in direct relation to our own subjectivity.

[11] Center for Genetics and Society/Friends of the Earth, Web. 5 Jan. 2016 <http://www.geneticsandsociety.org/downloads/Human_Future.pdf >: 25.

Chapter 1 THE DEBATE ON HUMAN ENHANCEMENT

CRISPR is but one of the latest techniques of a long line of attempts to enhance humankind. The genetic and technological improvement of people has been examined by different thinkers and policy makers throughout the ages, as can be exemplified by Plato's discussion of selective breeding in *The Republic* around 380 BC.[12] But this race of improvement has been taken at a gallop now the possible realization of altering DNA through technological means appears to be within reach. Due to the rapid innovations in the field of the Life Sciences in the twentieth century people are forced to formulate opinions on issues that until recently no one could have imagined, such as the question whether to eliminate genetic diseases in future generations by using genome editing techniques or not.[13] With new possibilities, new choices have to be made. However, by the staggering amount of articles, books and symposia on the subject of human enhancement that have appeared in the last couple of years it is made painfully clear that people tend to have different ideas of what life is about and which course of actions should be taken in the confrontation with the ability to alter the biological state of being. These differences appear to be incommensurable on varying grounds, and exactly these specific issues have to be investigated first before we can continue with the discussion of art's activities. Where do the problems lie that people not seem able to overcome? In this chapter, I would like to discuss these multiple positions in the human enhancement debate in order to make clear what the reasons are for the current impasse. By doing so, it will become clear that what is needed is a platform in which incommensurable standpoints are opened up by alternative, insightful experiences.

Defining the Human

When Gregor Mendel presented his findings on pea plant inheritance to the world in 1865, a new perspective on the existence of organisms took shape. In combination with other factors such as the pervasive marginalization of religion, Mendel's research lead to the theorizing of genes as the building blocks of life that proved to be of fundamental importance in the efforts to understand our biological as well as metaphysical existence. Since the DNA molecule was visualized in 1953 and it was undertaken to write out the sequence of the 3 billion molecular

[12] Lynn 2001, 3.
[13] Check Hayden 2016, 402.

base pares of the Homo sapiens under the name the Human Genome Project (HGP), people have been convinced we are coming close to the solution to the secret of life.[14] And indeed, after the HGP has been achieved between 1990 and 2003, recent plans in the biomedical field to undertake the building of a human genome from scratch signify the continuation of this overwhelming faith in DNA's significance.[15] The focus on the quest to find out what it means to be human has thus turned its back to explanations of spiritual nature in order to face the physical. This implicates that with technological advancements like CRISPR and the HGP we should be able to control that what is considered one of the most essential part of human life – its materiality –, and therefore that we perhaps can change its meaning. Accordingly, we are arriving at the question where the limitations are of what defines us as human and whether we should seek those out.

In the debate there are those who have a strong conviction that the interference of technology in genetics will alter the natural state of human existence and interpret this as a dangerous situation. One of the most well known of these advocates is the North-American political scientist Francis Fukuyama. In a 2004 article he brings us a passionate argument against transhumanism and the change of our "biological destiny", in which transhumanism can be understood as the conviction that humans must enhance their biological state by means of technology.[16] Using the quote of The U.S. Declaration of Independence, Fukuyama claims that human enhancement goes against the statement that "all men are created equal".[17] The emphasis on this phrase is significant of its political perspective. In such a way, the bioconservatist stresses in his phrasing the effects of technological innovations on the society at large.[18] He implies that directed human enhancement would lead to an unbalance between people able to afford these technologies and people who are not able to, posing a real threat to equal opportunity. He thus connects the concept of equality with the unaltered, 'natural' state of human biology, and criticizes enhancement as unequal, ergo unnatural.

Following this logic, enhanced persons cannot be called humans anymore, as Fukuyama hints at when he refers to them as "creatures".[19] He bases the biggest problem that

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[14] Zylinska 2009, 126-127.
[15] Regalado, Web. 11 Jun. 2016 <https://www.technologyreview.com/s/601540/ethical-questions-loom-over-efforts-to-make-a-human-genome-from-scratch/>.
[16] Fukuyama 2004, 42. The position of transhumanism on the moral spectrum of human enhancement is articulately set out by political scientist and ethicist Robert Ranisch, see Ranisch 2014, 3.
[17] Fukuyama 2004, 42.
[18] Bioconservatists are those who in general oppose all forms of (radical) human enhancement and are mostly concerned with questions of evaluative and moral nature, see Ranisch 2014, 4.
[19] *Ibidem*, 42.

results from these new beings again on social grounds: namely that the posthumans might claim rights that don't correspond with ours. They could stand in the way of our desires of self-realization. We can see that Fukuyama perceives human existence thus as something that is predefined that only has to be 'filled in', without interfering with the structure, and the human enhanced should therefore be understood as something that is derailed of the natural human course of life. For that reason, he ends his argument by stating that it is wrong to alter human biology because we are now the stable product of evolution. Therefore, all our "key" characteristics should be preserved because we don't know what else might happen to us when we change one or a selection of these assets.[20] So, in his belief the fundamental aspects of our biological and psychological core are in balance and should not be changed. Any change of the materiality of humans is thus a threat to what it means to be human and our possibility of self-determination.

In this line of thinking, the only way to preserve our natural state of being is when we won't interfere with the flow of evolution. This is somewhat in agreement with what the advocate of moderate human enhancement Nicholas Agar believes in. Agar is an Australian professor of ethics and in 2010 he published his book *Humanity's End* in which he explains his concerns on the implications of radical enhancement, defined as those technologies that can improve "significant human attributes and abilities to levels that greatly exceed what is currently possible for human beings".[21] In his argumentation, Agar bases his definition of humans on the understanding of the Homo sapiens as the collection of individuals who are biologically connected through the ability to breed with one another and not with members of other species, but the philosopher immediately acknowledges that this approach faces certain challenges in our biotechnological times.[22] He therefore expands this idea with the conceptualization of the human as a cluster concept, of which a certain set of conditions of both physiologically, behaviourally and psychologically states are of importance when identifying one as human, but none of which is essential when considered in isolation. The danger of radical enhancement to him is that the aims of such a project will alter this distinctive human combination of traits.[23]

Just like Fukuyama, Agar thus also shows his concerns of the differences of values between the radically enhanced and the non-radically enhanced. He even considers it as one

[20] Fukuyama 2004, 43.
[21] He makes thus a distinction between moderate medical enhancement and radical non-medical augmentation see Agar 2010, 1.
[22] *Ibidem*, 19.
[23] *Ibidem*, 21.

of the biggest threats to human existence. According to him, the elimination of valuable experiences that will go hand in hand with the disappearance of physical and mental challenges will turn us in fundamentally different beings, which has the consequence that the values of these new beings won't coincide with our human values.[24] This phenomenon of the appreciation of certain values solely by specific species is what Agar calls species-relativism.[25] Even though he tries to remain somewhat non-egalitarian when it comes to the judgment of contrasting values between species, the fact that he solely focuses on humans versus posthumans is a sign of anthropocentrism in his argumentation, since he refrains from thinking in broader terms about the relation between humanoid and non-humanoid species, something more bioconservatists, bioliberals and transhumanists are guilty of.[26] Be that as it may, while Agar is in close accordance with Fukuyama when considering the protection of human nature, problems between the two thinkers arise in the discussion of their starting points. Whereas Fukuyama is interested in the possibilities and limitations of human self-determination, Agar instead concentrates on a biological interpretation of the human essence. This may account for their discrepancies in matters of moderate enhancement, which indeed won't change the biological nature but will influence the course of one's life.

In contrast to these rejections of radical genetic engineering, we can also consider the stances of those in favour of such technological practices. Just like Agar, Swedish philosopher Nick Bostrom also believes that the nature of humans consist of a gathering of so-called "general central capacities".[27] Only this theorist can be considered as one of the transhumanists who "explicitly affirm the possibility to overcome human nature" and shows no concerns about a possible loss of human essence.[28] According to him, the posthuman is an individual who has exceedingly enhanced one or more of the capacities that are related to health span, cognition and emotion.[29] He does not really directly discuss whether the nature of the posthuman is human or not, but by stating that many of the enhanced qualities in the posthuman are those qualities we already show substantial appreciation of in our contemporary society, it seems that Bostrom sees the posthuman solely as an *improved* state of being, but nonetheless human.[30] As expressed in the conclusion of his paper on a posthumanist future, Bostrom simply believes that the posthuman is just a "type of human

[24] Agar 2010, 15.
[25] *Ibidem*, 13.
[26] Zwijnenberg 2014, 138.
[27] Bostrom 2008, 2.
[28] Ranisch 2014, 3.
[29] Bostrom 2008, 1.
[30] *Ibidem*, 6.

mode of being".[31]

To support his claims that a posthuman condition is something we in fact should want, he draws attention to the so-called status quo bias, in which a current state of affairs is not only compared to other situations, but also irrationally preferred. He and other transhumanists namely believe that the "rightness of actions depends on the goodness of the consequences" and shows therefore a strong preference for the active betterment of situations.[32] In a paper he wrote together with Toby Ord called 'The Reversal Test: Eliminating Status Quo Bias in Applied Ethics' (2006), he tries to provide a method to find out whether someone has a subconscious preference for the current state of affairs even though an alternative state could be considered better. Essentially, his objective is to remove some of the objections opponents of post- and transhumanism have and revise their perspectives by asking counterintuitive questions.[33] In case of Fukuyama and Agar this refers for instance to the fears of the future inequality that will be generated between those who were able to obtain genetic engineering and those who weren't. Bostrom and Ord unfortunately ignore in their reasoning that they themselves are employing a hierarchical spectrum based on *quality* of life when making distinctions between living conditions, whereas Fukuyama and Agar are concerned with the *definition* of (human) life, something that cannot be placed on a hierarchical scale. So Bostrom and Ord's method could only function in a hypothetical situation in which a flexible conception of the 'essence of humanity' is been applied, but loses its usability when the definition of human essence is specified. Yet by mostly neglecting to define what the human situation in biological and analytical sense will be like in a utopian posthuman future, Bostrom enriches his approach with the power of speculation. In that sense he is able to confront people with the relation between technological enhancement and personal desires of improvement. He thus overlaps somewhat conceptually with Fukuyama when it comes to self-determination, but refrains from expanding on what he himself sees as the 'self'.

A Matter of Proceeding

As a result of focussing mostly on *why* we should want to be posthuman, Bostrom leaves the matter *how* we should understand and deal with this situation open for interpretation. This is

[31] Bostrom 2008, 24.
[32] Ranisch 2014, 5.
[33] Bostrom 2006, 664.

where Rosi Braidotti tries to jump in. In her book *The Posthuman* (2013), the Austrian-Italian philosopher attempts, after calling for the end of classical Humanism and its oppressing establishment of European and anthropocentric values as universal truths, to provide her readers with a new conceptualization of posthuman subjectivity in a biopolitical era. This new formulation of identity should, according to Braidotti, be understood as a "relational subject constituted in and by multiplicity".[34] This means that the human in contemporary, biotechnological times is not an isolated species with a fixed core, but is based on a non-unitary identity that is defined by its relations to other things and phenomena. Namely, the theorist believes that living matter, including human embodiment, is intelligent and self-organizing, and that all matter is connected through the life force she calls *zoe*.[35] She therefore assumes that every entity, from humans to animals to plants and the whole earth, has the same non-physical essence that is related to their materiality. This does not mean that all things are holistically connected or indistinguishable from one another, but that the interrelations between different subjects constitute the identities of each of these subjects.

Braidotti understands that her emphasis on the relationality of matter is a challenging form of subjectification and identification, very different from the century old centralization of the human experience in ethics and policy making. She therefore proposes that the workings should be explored through experiment and alternative representations,[36] and emphasizes that her theory is not intended as a belief system but a communal project that asks for the active construction of new normative frameworks.[37] However, the explanation of the self as "differential and constituted through embedded and embodied sets of interrelations" is of such an abstract nature that it appears many steps away from a sensible translation into practice.[38] Accordingly, by applying a new way of thinking as the solution to the conceptual difficulties of current biogenetic capitalist times, Braidotti creates something that seems even more challenging than the comprehension of a human whose DNA has been technologically altered. She does call for a paradigm shift, but does not hand out the findings that will make it happen.

There are some, however, who think that such an epistemological deviation away from humanism is not needed at all for the placement of the genetically enhanced human in our society. The American bioliberal philosopher John Harris states in a passionate argument

[34] Braidotti 2013, 49.
[35] *Ibidem,* 60.
[36] *Ibidem*, 78-80.
[37] *Ibidem*, 92.
[38] *Ibidem*, 137-138.

in *The American Journal of Bioethics* that our policy procedure in relation to the biotechnological developments was working rather well. He claims so in reaction to the recent upheaval about CRISPR and other contested germline interventions when he compares the contemporary criticism with the protests that came to the fore during the last decades of the 20th century when In Vitro Fertilization and cloning were hot topic. Harris believes that the fears concerning the new medical biotechnologies are baseless, because the steps taken in the development of the older procedures were heavily regulated and controlled, and proved to be "highly beneficial to humanity".[39] He finds that our real duty here is to create the "best possible child" so we will prepare our human biology for the more "real" future challenges of viral, bacterial and environmental grounds. Therefore, he suggests that we continue scientific research on these technologies in countries with tight regulation of such practices until the safety and efficacy can be ensured to make them available to the public. Only then a democratic discussion can take place about further regulations and usage.[40]

Yet when it comes to his considerations of procedural formulations, he forgets an important factor in the issue of reproductive technologies: those people who actually provide their bodies for scientific research – at least this is what medical biochemist Gabriele Werner-Felmayer and ethicist Carmel Shalev claim in their reaction on Harris' article. They understand his proposition to continue the scientific climate of medical biotechnology as the neglecting of the suffering of the women as "bioresource providers".[41] This consideration of the actual subjects of research relates to what science reporter Erika Check Hayden calls for when she suggests that present-day CRISPR targets should be included in the decision-making process of the technological developments.[42]

In fact, what these critiques on the reductionist attitude of Harris are referring to is the difference in policy subject. While Harris is mostly concerned about the scientific aspects of the technologies and the question whether the technologies simply work or not, Werner-Felmayer and Shalev as well as Check Hayden focus their attention on the more personal experiences triggered by the medical operations. This brings us back to the question that stands at the core of the human enhancement debate; when encountering contrasting goals or ideas about the consideration of the genetic engineered subject, which aspects are deemed more important to consider first and from which perspective? Only when the motivation, the

[39] Harris 2015, 30.
[40] *Ibidem*, 33.
[41] Werner-Felmayer 2015, 49.
[42] Check Hayden 2016, 405.

main thought, behind the procedural problem is formulated, we can know what is most valuable and what should be done to comply with this value.

In conclusion, what it comes down to is that a lot of discrepancies in the debate find their cause at the precise stating of the problem and what the definitions of the concepts within the problem exactly are. This complex and multifaceted issue seems therefore in a stalemate position. But even when the advocates in de debate are able to exactly define the issues they are referring to – may it be human nature, the posthuman condition or the essence of biological materiality –, when the definitions don't coincide, the further steps about the (hypothetical) placement of a posthuman in society can only be made in *different* conversations. There seems to be a need for a platform in which all these contrasting aspects can be included, without having to neglect ones fears and desires even if they are about contrasting definitions of humans, enhancement and relationality. And I believe that this platform can be found in context of art, and the explanation how this might come about is what I will discuss in the following chapters.

Chapter 2 THE NOTION OF DESIRE

In analytical terms, CRISPR can be understood as a technique working on the pre-cellular level of molecules within the hierarchy of biological organization. Since this is the smallest level and all other biological systems – from cells to tissues, organs, organisms and even biospheres – originate from this, the technology is dealing with the buildings blocks of the architecture of life, something that evokes the imagination of many. In the conception of CRISPR and the intention to perfect its utilization, nothing seems predetermined – ethics aside – and therefore a true experience of practical freedom to do whatever pleases seems just around the corner. A common conception is that it will give scientists the possibility to transform the layout of the human body to a different and even ideal state of being. But when ethics are included in the debate, the question arises who determines what the ideal body is, and more importantly, what it exactly is that leads to the conception of this person's idea of perfection. What is the internal drive that triggers the development of a hierarchy of preferred traits? On which grounds are decisions regarding the possible alteration of the human condition based? The wish to change as well as the refusal to alter biology stems from one of the most intrinsic states of the human condition: that of desire.

The concept of desire is a complex one. It is a force we are aware of both cognitively and bodily, that what makes us tick and that guides our attention towards certain things. It is often a deciding factor in what we chose and is therefore partly what makes us who we are. Nonetheless it appears as something we cannot totally control, as something that drives us instead of what we master ourselves. And since the answer to what it is we desire is anything but univocal, I argue that there is a demand for a medium in which we will be able to understand the forces that drive our own and others' conception of preferences, and that this can be found in the field of art. While other epistemological practices have utilitarian reasons behind their methodologies, and are therefore driven by the desire to achieve certain goals, art is especially eligible to this need because it lacks exactly this pragmatism; a desire for something external is absent. By not having a specific desire guiding the research, in the collision between art and biotechnology the mechanisms and forces that steer biotechnological conduct can thus be acknowledged freely.

The desires that are at play in the technical improvement of bodies are specifically addressed in the work of artist Stelarc (b. 1946), particularly in his project *Ear on Arm*. His philosophical attitude towards the fusion of technology and the human body shows the

importance of affective experiences in relation to the taking shape of our desires. I shall therefore discuss in relation to Stelarc's work Brian Massumi's theory of affect, because his precise vocalization of the process of sensation and movement provides perfectly a set of concepts that help us understand the workings of bodily forces. His theory will also guide us to another aspect of desire, namely the sexual kind. Sexual desire is key to the process of reproduction, which is on itself a fundamental part of human existence as a species. From a Darwinist perspective, many, if not all, of the choices we make in our lives are directly or indirectly connected to the mechanisms of survival of the fittest and natural selection, so all the desires we experience in life could be understood as sexual, and biotechnological research is no exception. At least this is what bioartist Adam Zaretsky celebrates in his art, which we shall see in the discussion of the work *MicroSushi, Microinjection Food Science*. A powerful inspiration for Zaretsky and one of the most important theorists of sexual desire is Georges Bataille, and I shall therefore discuss his reflection on the relation between pleasure and violence when looking at the bodily consequences of affect on desire. It this way, the dreams and wishes that are so characteristic of the discourse of CRISPR shall become graspable through the lenses Stelarc and Zaretsky provide.

The Affectivity of Technology

When it comes to human enhancement, what is at play in the minds of many bioconservatists, bioliberals and transhumanists in general is the notion of improvement. Whereas conservatists fear the restriction of the possibility of natural, inherent improvement when the technologically enhanced posthuman is brought about, for bioliberals it is the improvement of health that makes them root for the application of certain enhancement technologies. And the concept is especially characteristic for transhumanists, because their case is about the improvement of what we like and what we dream about becoming. In other words, the discussion revolves for many around the question how we should get what we consciously desire. Yet we saw in the first chapter that this is a question that does not solve the conceptual challenges of human enhancement, but only enriches them. Even though transhumanists like Bostrom try to claim the opposite, this is due to the lack of one specific fixed object of desire; there exist an infinite amount of wishes, of which some are simply incommensurable. So when we apply technology as a means to come closer to our desires, we are in fact using technology as an extension of ourselves in the attempt to live a meaningful life. We use it as the active agent of our inner turmoil. Since this is a hard pill to

swallow, we have to turn to the work of Stelarc, the master of the technical body, to be able to get a grasp on the workings of desire.

The Cyprian-born artist Stelarc (1946) confronts his audience in performances with his own technologically altered body, in order to provide them the opportunity to literally see how the probing, amplifying, robotizing and biotechnologically editing of the human physique can influence one's awareness of the world. He is most well known for his body suspension performances in which he lifts himself in the air by ropes attached to hooks that have been pried through the skin on his back, but also the developments of a robotic third arm and a six-legged walking machine contributed to his fame in the field of art and science. Conceptually, throughout his whole oeuvre he aimed at the perception of technology not as a science that provides tools and methods for the human to use, but as an environment or a network that consists of forces and relations.[43]

Aside these projects, for more than twelve years Stelarc has been attempting to develop an extra ear on his body. He started this ongoing project when he wished to surgically attach an ear behind is right, real ear, but soon discovered that such an endeavour was dangerous and almost impossible to achieve due to the inflexibility and anatomical specificities of the skin of one's head.[44] After first flirting with the experimentation to externally grow an ear in vitro in collaboration with bioart initiative Tissue Culture and Art Project, Stelarc decided after being well informed by medical experts to make an attempt to construct an ear on his arm, the *Ear on Arm* project (fig. 1). Until now, already two steps have been taken to fulfil his fantasy of a third ear. The first step was that of the insertion of a silicon implant under the skin of his left arm, to stretch the skin so it will be ready for the application of an foreign object within the body. After some recovery time the arm was deemed ready, and an ear shaped and porous polyethylene prosthesis was placed on the location where the skin had been adjusted. Since the material of the prosthesis would partly be replaced by Stelarc's own tissues, the previously external object would fuse into the new biological state of the artist.[45] The second step of the project was aimed at the addition of a miniature microphone in the new ear that would enable a wireless connection to the Internet so people all over the world would be able to experience the sounds that could be heard in Stelarc's bodily context. With an additional function it would allow Stelarc to receive sounds send over the Internet as well. The first attempt to achieve this failed, due to an infection that

[43] Zylinska 2009, 170.
[44] Stelarc, Web. 16 Mar. 2016 <http://stelarc.org/?catID=20229>.
[45] Stelarc, Web. 16 Mar. 2016 <http://stelarc.org/?catID=20242>.

appeared underneath Stelarc's skin, and the microphone had to be removed. Future plans to re-insert the listening device are in the making, but until now nothing yet has been actualized. But considering the many challenges along the way he tried and is still trying to overcome, it is clear that his persistence to realize this technological dream is exemplary of the seriousness of his desire.

In this regard it is not surprising that Stelarc's main philosophy is that the body is obsolete;[46] the body is always in a condition that is not enough, subordinate to something more. Such placement of the body as something imbalanced positions it therefore as in a state of desire to something else, another state of being. It is a relationality that is constituted by the force of desire. His intention to insert an electronic audio device in his body is exemplary of this relation to another mode of being. It namely introduces other bodies to the artist's own body, by means of technology. This is established by the turn to one of the common senses of the human experience, that of hearing, because when the audio device changes the solo experience of sounds in the body to one of many, a new form of agency is introduced. Stelarc himself calls this "a nexus or a node of collaborating agents" that will generate "an excessive technological other, a third other" which presence is "manifested by a locally situated body".[47] It is the plural occupation of one body that is stretched in its own skin by an ear shaped object and subsequently extends beyond its physical restrictions through a wireless connection with the Internet, the network of networks. The body is therefore not only occupied by its own "body-self", but also by other "body-selves", as well as their virtual existence, and according to social theorist Brian Massumi this constitutes the body now as a so called "self-network".[48] It is in this self-network that the relationality of the obsolescent body is expressed, and we will see that it can thus serve as a platform for the recognition of desire. But first we will have to look at Massumi's theorization of affect and dive in the workings of bodily experience.

The book *Parables for the Virtual. Movement, Affect, Sensation* (2002) by Massumi is a collection of articles that reflect on his own theory of embodied existence based on the writings by Bergson, James, Deleuze, Guattari and Foucault. The chapter he opens his book with discusses the workings of affect and sets the tone for the rest of the following chapters. In contrast to the comprehension of affect simply as emotion, which has been the case with many critical theorists and cultural critics who were under the influence of post-structuralism

[46] Stelarc, Web. 2 Jun. 2016 <http://stelarc.org/?catID=20317>.
[47] Stelarc, Web. 16 Mar. 2016 <http://stelarc.org/?catID=20242>.
[48] Massumi 2002, 127.

and deconstruction, Massumi places it in the field of non-cognitive empiricism.[49] Affect to him happens in an autonomic reaction to an event, before it is cognitively registered and a quality is attached to the experience. In this moment, previously experienced actions, which are conserved in the body, are reactivated before the actual expression of one of them. Affect thus exists in the realm of the potential, which Massumi also calls "the virtual".[50] The virtual is actually a lived paradox since it contains normally antithetic opposites, which he relates to the critical point in chaos theory when in a physical system "mutually exclusive potentials" are paradoxically embodied.[51] It is a place where incommensurable positions exist at the same time.

When the microphone would be placed in the body of Stelarc, the simultaneous existence of incommensurable actions can in fact be experienced. The device would namely be able to give voice to all the sounds that the users produce when they use the Internet connection, which would be heard by Stelarc as well as heard by these listeners at the same time. The technology is able to conceive the sensation of the body.[52] The third ear is therefore a tool that gives shape to the virtual, because the autonomy of affect is its "participation in the virtual" and thus the escape from bodily confinement, since the affect of an event is both experienced in the body of the 'receiver' as well as outside its body in the abstract realm of potential relations.[53] This bodily registering of the multiplicity of connections – the virtual – in the singularity of one of the connections that is about to happen is what Massumi calls "sensation",[54] and he therefore claims that Stelarc's art is "an art of sensation".[55]

Furthermore, when Stelarc chose to place an ear – the location of hearing – under the skin – the location of feeling – of his arm, not only the interconnectivity between different bodies are constructed, but also the different senses within the body are presented in their relationality. His art of sensation shows the connection between all registering organs, which materiality opens the body to the world it is placed in. Such conception of a network of sensory organs and that what lies outside the body relates to Massumi's observation that body and things are extensions of each other; the ear can be understood as a prosthetics to the body, but the body is also a relational prosthetics to the object – and thus to the world. In

[49] Clough 2008, 1.
[50] Massumi 2002, 30.
[51] *Ibidem*, 32.
[52] Jagodzinski 2012, 3.
[53] Massumi 2002, 35.
[54] *Ibidem*, 92.
[55] *Ibidem*, 97.

short, as the affect theorist would say, "matter itself is prosthetic".[56] What Stelarc in this way really shows us, is that through to addition of a material prosthetic onto his body, that also on technological, virtual grounds relates to other bodies and consequently their material existence, that the notion of affect extends beyond an individual, subjective experience. An earlier obsolesce of the body is overcome and the workings of desire that constitute relationality are acknowledged. It has the possibility to make the relationality between bodies, objects and technology visible and thus opens up the common ground in which we can share incommensurable experiences.

One could say that in contrast to some statements that this will take away the claim of human superiority, the acting body – in Stelarc's case the body with the extra ear – is in such a situation instead constituted as the major agent.[57] The body with the interconnected ear has the ability to influence what can be heard, which potentialities are more likely to happen than others. A hierarchy within the relationality seems to exist. However, this is more ambiguous when we consider the real course of action in *Ear on Arm*. Namely, we cannot ignore the fact that the microphone in actuality is *not* placed in the prosthetic ear; the first attempt failed miserably. Sometimes the course of an art project takes a turn that is not intended, but proves to add value to the overall impact of the piece. Cultural theorist Joanna Zylinska reflects on such a notion of failure in her discussion on *Stelarc* when she refers to the "possibility, or even inevitability, of an accident within" his projects that brings about a "creative evolution".[58] It is through the dimensions of technology's "accidental revelations" that we can truly understand its complex embedding.[59] More importantly, Stelarc's acceptance of failure shows his acceptance towards living with uncontrolled forces.[60] According to sociologist Patricia Clough such inclusion of unreliable complexities in the biomediated body challenges the biopolitical conception of the body-as-organism as *autopoietic* and breaks down the confinement of the body to and the utilization of its genetic information.[61] Thus, by opening his body to the "ecstasies of chaos […] that deform it", Stelarc shows us how he includes in his body the different forces of relations to other things that are present in his body, not with hierarchy, but with an emphasis of their different forces.[62] But by relating them to each other, others' experiences can be made part of their personal experiences. A

[56] Massumi 2002, 96.
[57] For the statement about human superiority based on Jane Goodall's argument, see Zylinska 2009, 171.
[58] Zylinska 2009, 171.
[59] Armitage 2001, 154.
[60] Zylinska 2009, 172-173.
[61] Clough 2008, 11.
[62] Jagodzinski 2012, 3.

network of matters is embodied.

The failure of the implant and the insertion and extraction of it in Stelarc's body brings us to another point of experiential investment: that of pain. Zylinska says about the photographs of the surgery, which are made by artist Nina Sellars, that the audience is included in the experience by the pictures' visual composition and theatrical light (fig. 2). The close-ups of the blood stained instruments poking into and under the skin, of the gaping gaps made into his fleshy body, create a simultaneous experience of horror as well as pleasure. It gives the viewers a certain "pleasure of survival, of getting over the 'cut'", a cut which triggers in them a desire for healing while at the same time they are becoming aware that they are in fact already healed.[63] It relates to when Massumi calls Stelarc's art "desire without object [but] as a process".[64] The lack of the pragmatic need for something is called into life by a repetitive sensation of affect, in which the process of the operation overcomes its objective. This is how we can understand technology as the active agent of our inner turmoil through art; it instigates through the notion of affect the mechanisms of desire.

Sexual Desire

Through the point of view Massumi presents us in his affect theory we understand how Stelarc's art brings us in a mode of sensation in which we are able to grasp the workings of desire. This mode of sensation is unmistakeably loaded with meaning, not only because it entices us to philosophize on its implications, but also because it is that what is experienced in the body as a state of wanting. It is the urge to take the next step, the foot hanging in the air ready to touch ground. It is the moment that is filled with vibrating anticipation, rushing through the body preparing one for that moment of release. It overtakes us in such a manner that is reminiscent of that other aspect of desire: the sexual drive.

Sexual desire that contains both seduction and repellence is specifically what Adam Zaretsky (b. 1968) embraces in his performative work. The North-American artist is well known for the shock-value of his projects in which he constantly oversteps his audience's comfort-levels by confronting them with cultural and scientific established taboos concerning biology and social behaviour, often while using sexual innuendos. Such inclusion of audience interactivity takes in a central place in most of his projects. It varies from the distribution of

[63] Zylinska 2008.
[64] Massumi 2002, 113.

inquiry forms about the ethics of the viewed performances, to the development of machines that can massage visitors' buttocks by the use of E. coli bacteria. In any case, he continuously works in his performances with visual elements that find their origins in the biochemical laboratory and uses them in unconventional ways, for instance when he places the nine most common organisms used in lab experiments – including himself as the Homo sapiens specimen – in one terrarium in front of a webcam that was on every hour of every day of a one week performance. By doing so, he intends to soften hardened scientific categories while making his affected audience susceptible for alteration.

One of the most used and criticized instruments in his performances is that of the microinjection system, which finds its function in the laboratory as a machinery to inject genetic material into organic cells. In the work *MicroSushi, Microinjection Food Science* (2001) Zaretsky injected Flying Fish eggs with Wasabi and cream cheese in order to call a new, exotic sushi/caviar delicacy into life (fig. 3).[65] The undertaking of this project was inspired by the artist's passion for gastronomy and his perception that the worlds of fertility science and of food science share similarities in the relation between protocol and experiment. The needle he used for the procedure, however, had already been used previously in experiments with biohazardous material, which consequently meant that the sushi/caviar was not intended for ingestion. Zaretsky himself stated that this only made the item even more of a specialty, and therefore even more desired by the connoisseur.[66] All in all, the way Zaretsky shows no hesitation to poke into the sensitive (t)issues of the carnal condition signifies his ability to feed his audience a mixture of the contrasting notions of attraction and hesitation.

During and after the events, Zaretsky is repeatedly drawing attention in his commentary to the sexual connotation of his performances, which often are combined with cringe worthy, invasive and repelling gestures related to the content of the work. In contrast to the current humanist bioethics of "informed consent", Zaretsky seems therefore to acknowledge the inevitability of violence in laboratory conduct, which for instance becomes clear when we look at the documenting picture of the penetrated Flying Fish egg by the needle (fig. 4).[67] While poking into the tissues in the biotechnological lab, Zaretsky is aiming for the disruption of the established values that serve as guides in the practices of the Life

[65] Zaretsky 2007, 267.
[66] Zaretsky, Web. 17 Mar. 2016 <http://emutagen.com/mcinject.html>.
[67] Zylinska 2009, 167.

Sciences.[68] He shows us that these values are related to the (male) erotic desires that can be found in the most intrinsic core of human existence. The artist states that the field of biotechnology is actually "the great show about revealing nature", until it eventually has been forced to "lay terminally open, legs bound in universal stirrups, screaming and heaving under the heavy-handed methods of investigation".[69] By such a direct phrasing of the conduct of research, he lays bare what, according to him, are the actual drives that are lurking behind it. It is not purely about the search for solution, about a utilitarian cause based on an previous established needs, but the continuous poking and pulling at the strings of life can simply be understood as a way of intercourse; sometimes it is simply done because of the sheer fun of it, being driven by the engines of lust.

In his theoretical investigations on sexual forces in scientific research, Zaretsky often refers to concepts derived from George Bataille's writings.[70] His book *Erotism. Death and Sensuality* (originally published as *L'Erotisme* in 1957) is a monologue about the relation between desire and death and how these constitute human existence. Bataille claims "life reaches is highest intensity" in the pursuit of pleasure that is ambiguously aimed at the *destruction* of life.[71] He bases this paradox on the understanding of the unbearableness of experiential pleasure that finds its roots in anguish: the fear of destroying of that what is dear.[72] Keeping alive this constant threat lights the fire of desire. However, this paradox asks at the same time the construction of rules and taboos to keep the disastrous consequences of desire and violence at bay – which is death –, and this is what according to Bataille constructs the binary nature of humans. It namely resides partly the inner force that is driven by pleasure that contains it's own destruction, and it resides on the other hand a purposeful and aware part of human nature which is constituted by rules specifically to refrain the true working of its inner desires. Therefore this deepest part of human existence can never be truly reached; its nature is defined by "heterogeneous parts that never blend".[73]

But it doesn't stop at that, because at the same time, to safe him or herself from the devastation of the inner world, (wo)man *needs* to know his/her sovereign aspirations. This can only be known when the established guidelines are broken, when transgression is constituted as the precondition of taboo, because "rules depend on what they are designed to

[68] *Ibidem*, 160.
[69] Zaretsky 2004, 42.
[70] For instance in the discussion of human's sadistic tendencies, see Zaretsky 2012, 134.
[71] In this line of reasoning Bataille takes Marquis de Sade's writings as his inspiration, see Bataille 1986, 180.
[72] Bataille 1986, 178.
[73] *Ibidem*, 193.

prevent".[74] And this neglecting of one's rational endeavour, this act of violence, will bring one therefore "besides oneself", besides one's dual nature.[75] Desire is thus an excessive experience that exposes us to death as the negation of existence, and "places us beyond being and transgression".[76] In short, it opens us to a state of awareness about what it means to be alive by the experience of its opposite; it reveals the realm of potential.

And, referring back to Massumi's theory of affect, the realm of the potential was that state of bodily awareness of the overarching multiplicity of connections. It is in the true affectual experience that we get an impression of what it means to be a living, acting and relational being in the world and what it means to lose this. This is the autonomy of affect, since it is based on the openness and participation in the virtual; it is "the perception of one's own vitality, one's sense of aliveness," the "perception of this self-perception".[77] Desire thus is connected to the real autonomy of affect, in which all relationalities, possible reactions and interactions are constituted; the whole ontology of one's existence can be felt.

So when in Zaretsky's genetic experiments taboos are broken in the pursuit of desire, what in fact is opening up an understanding of life. Zaretsky does not claim he is changing the essence of Flying Fish when he injects them with 'alien' substances, but when he penetrates the protective cell membrane and thereupon squirts into the cell's core, he literally opens its essence to the rest of the world. Just like Massumi explains Stelarc's work, Zaretsky thus "tweaks" the organic body to "a sensitivity to new forces" so the "hypermutability" of existence emerges.[78] It is not about the aim of achieving something, but about the processual nature of desire. In the creation of an uneatable delicacy he is thus not trying to come to a usability or goal of the design, but he instead consciously activates the mechanisms of 'wanting' deprived from a resolution by using the language of desire – the poking, the carnal drives to experience unique taste sensations, the flirtation with dead by penetrating the food with a hazardous needle. We, as sexual reproductive Homo sapiens, recognise the mechanisms of seduction and selection, and hear them speak to our basic instincts. And when it does, our gut resonates with the potential that the Microinjection art piece withholds.

As we can see, in the opening of all pure potentiality as the autonomy of affect by activating desire's dynamics, art shows a forceful power to unite alternate or even incommensurable

[74] O'Shea 2002, 935-936.
[75] Bataille 1986, 192.
[76] O'Shea 2002, 935.
[77] Massumi 2002, 36.
[78] *Ibidem*, 112.

perspectives. The desires that structure the varying point of views are not neglected, but instead function as roads leading to the virtual, the Rome of all connections. Through the projects of Stelarc and Zaretsky desires thus all find their core in the flirtation with that what lies beyond being itself, of that what conditions existence. So when artworks like theirs would be included in the debate of human enhancement, it wouldn't tell the different advocates what it is they should want, but would allow them to experience the autonomy of affect that is formed by their desires. In that sense, they would have the opportunity to understand the topic outside the framework they individually apply and more from an attitude that accounts for the boundless relationality of being. The artworks thus affect the bodily states of the spectators, and for that matter they open up the audience's awareness of the different forms of matter that actively shape who they are and what they want: desiring identities standing in a network of relations.

Chapter 3 THE CONNECTED SELF

As previous chapter showed us, the concept of the human identity isn't as one-sided as it seems. Stelarc's and Zaretsky's art brought us in confrontation with the multiplicity of being and proved to be able to open up a network of materiality and agency to their audiences through affective experiences. We have therefore established that already on an intimate level a person can be understood as relational. On a more general level, this can be linked to the notion of the biological individual, which has been a widely contested subject in the discourse of the Life Sciences. Originally the biological individual has been understood as a unit of selection within the biological world, referring to a wide variety of individuals such as organisms, genes, molecules and rhizoid structures. Not surprisingly, such an extensive range of candidates brings about certain difficulties. Biological theorists like Ellen Clarke, Robert Wilson and Matthew Barker have been rooting for the redefinition of the concept in relation to our conception of identity due to the serious implications on issues of scientific and philosophical nature.[79] Instead of limiting, for instance, the human identity to its bodily existence, these theorists stress on the lack of a static state of the body, and the dependency of the body on its environment.[80] Philosopher Heather Widdows based these convictions of the human, especially its genetic self, on varying biological facts such as the presence of millions of microbes in and on the human body, and on the constant exchange of bodily material between individuals. Because of this, she sees the human and its genetic identity as both sharing as well as identifying.[81] This implies that she on the first hand observed that the closer relationships between people, kin and within ethnic groups are, the more genetic information is shared.[82] And on the other hand she noticed that it is identifying because genetic information can always be used as a reference to a certain person and its kin, especially when the information is compared.[83] The biological self should therefore move away from its conception as the individual self, and should instead be understood as the connected self; it always exists in relation and in overlapping with others.

The reason why these theorists make such claims becomes abundantly clear when we

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[79] Clarke 2010, 323. Wilson, Web. 1 Apr. 2016 <http://plato.stanford.edu/archives/spr2016/entries/biology-individual/>.
[80] On the lack of a static body, see Herring 2015, 40. On the dependency of the body on its environment, see Campbell 2009, 14.
[81] Widdows 2013, 4.
[82] *Ibidem*, 36-37.
[83] *Ibidem*, 43.

look at the implications of CRISPR. In the CRISPR affair, the human genome lies open, ready to be dissected and biochemically altered. For the possible editing of this genome, the presence of certain genes should therefore be known. Widdows explains why such research is problematic when reminding her readers that genetic information about an individual also gives information about others due to the genetic connection between family members.[84] The actions of one person might confront others with something they don't want to hear, so a clash of interests might occur. Furthermore, if persons who edited their DNA would decide to have children, and consequently passes on their altered genes, another aspect of their connected self is introduced. Again, the decision of an individual influences the lives of others. It comes down to the awareness that with every decision taken on the playfield of genetics, the biological relationality of humans is on the table.[85]

On top of this, the social relevance of CRISPR is also related to other genetic exchangeabilities. As stated before, one of the biggest concerns is based on the genetic alteration of certain life forms, such as bacteria and viruses, which can have widely transmutable effects and thus might lead to a big impact on the environment. Already within the professional scientific community this is deemed problematic,[86] but it becomes even vaster when the democratization of CRISPR is taken into consideration. For years already, people expressed their concerns about public health threats supposedly coming from do-it-yourself practices,[87] and CRISPR is no exception.[88] The United States' director of national intelligence has even placed it on the list of potential weapons of mass destruction and proliferation in the annual worldwide threat assessment report.[89] All in all, we can state that its social implications constitute multiple challenges that have to be considered in the debate of the technique.

For this chapter, I would thus like to focus on two artistic projects that shed light on these issues and show the ability to provide insights that are of use in the complex discussion. First I will discuss the project *Genetic Heirloom* of Revital Cohen and the way the designer deals with the heritage of genes through family lines. Then I will look at the collaboration

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[84] Widdows 2013, 37.
[85] This can even be taken further when the field of epigenetics is taken into account; often factors that will influence the expression of one's genes will have a similar effect on others' genes as well. In this sense the mechanisms of genetics are also shared and connected.
[86] Ledford 2015b, 24.
[87] Zimmer, Web. 11 Apr. 2016 <http://www.nytimes.com/2012/03/06/health/amateur-biologists-are-new-fear-in-making-a-mutant-flu-virus.html>.
[88] Brown, Web. 11 Apr. 2016 <http://fusion.net/story/285454/diy-crispr-biohackers-garage-labs/>.
[89] Regalado, Web. 16 Feb. 2016 <https://www.technologyreview.com/s/600774/top-us-intelligence-official-calls-gene-editing-a-wmd-threat/>.

between tactical media collective Critical Art Ensemble and multi-disciplinary artists Paul Vanouse and Faith Wilding, called *Cult of the New Eve*, to expand on the implications of do-it-yourself biology. The common thread that will link these artworks together will be based on Michel Serres' notion of the parasite, which shall prove itself to be of importance when we discuss the implications of art's potential disruptive force on technology's discourse. Overall, what we will see is that the knowledge production of art comes to the fore in the discussion of CRISPR's social implications, but that the engagement of an audience often appears to be a challenge.

Genetic Heritage

The genetically connected self is the theme that structures the three partite project called *Genetic Heirloom*, produced by Revital Cohen (b. 1981).[90] Just like in previous works, she aimed here at the juxtaposition of the artificial with the natural through the development of fictional scientific objects. For this she created three designs, the *Disclosure Case*, the *Interventionist Healer* and the *Guilt Adjuster*, that all address the genetic heritage of diseases. The *Disclosure Case* can be understood as a modern Pandora's box, in which future parents could enclose their genetic information combined with a symbolic treatment for a non-mentioned disease (fig. 5). Family gold was infused into the cure, meant as a link between medical and cultural values. Only when the hypothetical child wishes to know his/her genetic makeup and the diseases lurking with it, s/he could open the box. The designer underwrites in this way the inheritance of knowledge, and opens up the question whether it is wanted or not. The second artefact also deals with the provision of cures. The *Interventionist Healer* is a piece that has its focus on the effect of epigenetics, the mechanisms that influence the reading and expression of genes. Knowing that the environment of an organism is of major importance in the effects of epigenetic operation, Cohen developed a machine that would spray a serum on an individual that would consequently suppress the genetic disease (fig. 6). This piece follows the choice to not alter the genome containing a deadly DNA sequence but mirrors the attempts to actively work with the cards that one has been dealt. The final object that made the *Genetic Heirloom* series is the *Guilt Adjuster*, in which a child that doesn't carry a genetic disease, in contrast to their family members, could inflict themselves pain by the infusion of a poisonous liquid in order to relieve the child of so called Survivor's Guilt

[90] From 2012 onwards Cohen shares her practice with designer Tuur van Balen.

(fig. 7). Provided within the same construction is an antidote, so the user is able to start their own "journey of pain and healing".[91] Other than the first two pieces, this item thus appears to make room for the negative psychological effects that one who is genetically 'superior' can have.

In all the designs, Cohen chose for the inclusion of nanoparticles of gold that she infused into the liquids. This choice has a strong resonance on artistic grounds; not because of its shimmery quality, but by the meaningful act of using the precious material the designer creatively relates our biotechnology tainted times with the thousands years human tradition of passing down material fortune through family lines. The precise decision to include gold mirrors an awareness of the cultural value that is given to heirlooms and the importance of tradition, an she links this with recent technological innovations in the medial field in which nanoparticles of gold are emerging as a promising agent in cancer therapy. Connecting thus a cultural tradition with a matter of medical functionality, Cohen visually questions how much of our valuing of genetics is practical and how much it is based on cultural constructions.

However, because of its strong speculative nature, the objects still remain somewhat on safe ground. The visually pleasant designs certainly address issues of the connected self, but do not seem to engage their audience in the same affective manner that the shocking and confronting artworks of Stelarc and Zaretsky are able to bring about. They put the topic on the table without enticing a bodily reaction, associating with no one directly. Perhaps they are too easy to see and miss therefore the opportunity to entice an emotional or surprising response in its audience. Subsequently, a confrontation with the viewer's own actual connected self fails to happen.

Of the three, the *Guilt Adjuster* is the piece that shows the most ability to cause friction in its viewer: notions of guilt and punishment do have the ability to demand initial reluctance responses. Frustrations with the possible guilt trip of a blameless non-carrier child can be guided to frustrations with the social values of genetic similarity. The choice to make a designer's object that punishes its user for being healthy points namely a finger at the weak spot of our rules around communal suffering and the bonds that it creates. More importantly, it also confronts us with the related need of something negative to cope with life, the need for a disruption. French philosopher Michel Serres calls this disruption the parasite, something that disorganizes a 'harmonious' system with the aim to bring about a new order.[92] Cohen's

[91] Cohen and van Balen, Web. 11 Apr. 2016 <http://www.cohenvanbalen.com/work/genetic-heirloom#>.
[92] Serres 1982, 12-13.

speculative *Guilt Adjuster* does just this; it supposedly creates a disharmony in its user's health, so a new order between the user and their family can be brought about. Namely, as an isolated event in a body, the poison has the effect of solely taken away health from its user, similar like a genetic disease, and thus constitutes a non-reversed relation. This one way *suffering* of the child, and not the poison itself, entices sympathy with their family members. The relation between the family members and the child employing the *Guilt Adjuster* that originates from the relation between the child and the poison reflects a one-way flow of conduct, and that resonates to what Serres would call parasitic, a relation from guest to host.[93]

When we discuss in more detail Serres' notion of the parasite, we can see that it defines a relationality that can be found in our understanding of human biology. The disruptive event that causes a new order is the core of organic evolution, when mechanisms such as mutation bring about alternate offspring. The biological flow of organic life is thus based on "the intervention of a noise in the message".[94] For that matter, figuratively sounding the clamour of change, the trumpet shaped nozzles of the *Interventionist Healer* point to viewing epigenetic conduct as the disruption of the mutation that brought about the genetic disease. It underlines the flow of parasitic relation in evolution's course, and opens up the awareness of our related selves. We don't live an individual existence, but are connected within the flow of parasitic conduct. By being, "we are always threatened to be anew".[95] Key to Serres' vision is thus the system of relation in which all elements are intersubjective. In the intersubjective world, things are not inherently subjective or objective, but their identity is marked by the power of the 'quasi-object'. The quasi-object can by understood as a thing that connects different subjects: it is a subject that constructs the collective by making the different units its subjects, like a ball in a football match does with its players. As objects of heritage, the *Genetic Heirlooms* are reminiscent of this. While fictively being passed down from one person to another, the objects mark their subjects and their relationality. The three designs some close to being quasi-objects, exposing the one who is dealt the genetic card of death. "The 'we' is be made by passing the 'I' ".[96] Even though they don't bring strongly affect their viewers to bring them in a conscious state of intersubjectivity, they do address connected self in the issue of genetics.

[93] Serres 1982, 8.
[94] *Ibidem*, 184.
[95] *Ibidem*, 232.
[96] *Ibidem*, 227.

DIY Biology

While Cohen's objects simply work in the line of one family, the intersubjectivity of the genetic research can also be extended to a larger platform. This is where the culture of do-it-yourself biologists comes into play, when we consider the relationship between different hierarchies of scientific conduct. Usually called amateurs, those active with DIY research have been part of science throughout its whole history. Scientists often appreciate the work of such 'laypersons' because they practice more fieldwork, instead of being active inside established institutions, and constitute themselves therefore as mediators between society and that what happens in the lab.[97] However, the turn to biotechnology in the scientific amateur community has been defined as both continuation as well as a rupture of its traditional place.[98] While a high experimental attitude is nothing new under the sun, the notable increase of homebuilt laboratories reflects the construction of different knowledge producing sites, which might eventually lead to the decrease of authority of the conventional scientific discourse.[99] In his PhD dissertation written at the Rensselaer Polytech Insitute on the DIY culture of biology, Jonathan Cluck identifies this changing relationship between scientists, amateurs and society as parasitic. How this parasitic change is brought about, and what it effect is on the scientific community will be expanded on later, but first has to be disclosed how this change of scientific conduct is related to power structures.

As the reception CRISPR demonstrates, the acknowledgement of DIY genetic research has been twofold. I have mentioned before that there are people who are concerned about the unknown dangerous consequences hovering in the darkness these 'amateurs' bring about, but we can see as well that a certain approval of scientists has been present based on the belief that DIY practitioners contribute to "our shared cultural archive".[100] This exemplifies what Cluck calls a shift away from the old fashioned "mechanisms of hegemonic control" in scientific conduct, in which scientists and amateurs are posited against each other in a binary opposition of self/other – where scientists are the self and amateurs are the other.[101] Nowadays, we can namely see that the scientific authorities attempt in a more incorporative attitude to assign DIY practices social roles as a mode of surveillance, while basing these roles on categorical degrees of value of goodness/badness. Michel Foucault

[97] Meyer 2013, 119-120.
[98] *Ibidem*, 121.
[99] *Ibidem*, 120.
[100] Kirksey, Web. 24 Mar. 2016 <http://somatosphere.net/2016/03/who-is-afraid-of-crispr-art.html>.
[101] Cluck 2016, 41. Cluck based this theory strongly on Heather Paxson's notion of microbiopolitics.

already warned us about this in 1976, when stating that in modernity, the era of biopolitics, sovereignty needs mechanisms of distributing value and utility over the living to remain in power.[102] Only by controlling life, power can keep hold of its dominion of the biopolitical body, but the development of too distinguished DIY practices can chew at its foundations. An inclusion of the practices by assigning them concepts of utility is therefore key.

It is in the condemned practices of scientific research, the place of the 'other', where the project of Critical Art Ensemble (CAE, formed in 1987) in collaboration with Paul Vanouse (b. 1967) and Faith Wilding (b. 1943) finds its grounding. As the name suggests, *Cult of the New Eve* (1999-2000) is a creation of the opposite of scientific authority and legitimation: that of a cult. They mimicked the vocabulary of such a religious movement by different techniques. First, they created a website on which they declared their faith in the New Eve, referring to the woman whose blood functioned as the (only) donor needed for the Human Genome Project, who the artists see as the new messiah in the "Second Biological Era" when genetic enhancement is achieved.[103] On this website they posted texts and images in biblical manner mixed with biotechnological design, while balancing a fine line between actual scientific achievements and fictional delusions (fig. 8). A strong transhumanist atmosphere can almost be tasted in the virtual declaration of its beliefs. Furthermore, on different occasions they performed their new calling in centres assigned for art or (medical) biotechnology. During these performances the group wore red sweaters showing the emblem of the New Eve, while they positioned themselves as informants by explaining the meaning of the Cult, the website and the near transhumanist future (fig. 9).

What the creators of the project attempted to achieve with the placement of scientific conduct in such an extreme subjective interpretation, is to expose its dogmatic principles and hidden ideologies and thus make their audience sceptical about all culture of technology.[104] The taking in of such a clearly critical stance is what especially CAE identifies with. The collective positions themselves as practitioners of tactical media, a DIY countermovement of consumer society whereby concerned citizens accommodate commercial technological media for pedagogical functions and tactical interventions.[105] The choice of the word 'tactical' is of great importance in this notion, because, basing their ideas on Michel de Certeau, CAE

[102] Foucault 1990, 144.
[103] Critical Art Ensemble 2000, 171. For the website, see Critical Art Ensemble, Web. 16 Apr. 2016 <http://critical-art.net/Original/cone/coneWeb/>.
[104] McKenzie 2000, 143.
[105] Critical Art Ensemble 2008, 538. They based their conception of tactical media on the definition by David Garcia and Geert Lovink, see Garcia, Web. 16 Apr. 2016 <http://subsol.c3.hu/subsol_2/contributors2/garcia-lovinktext.html>.

interpret tacticality as strongly related to a fundamental lack of territory. By being tactic, they take in the space of that what is not incorporated in the terrain of those in power: the space of the other.[106] Its higher aim is that by intervening the dominant structure of capital with actions of resistance spurring from these isolated zones, tactical media practitioners could be able to revise culture.[107]

The culture of the biopolitical infiltration into the human body is what they attempt to revise in *Cult of the New Eve*. On one page of the website a prophecy of the New Eve can be read whereby the coming together of the two biblical trees, the Tree of Knowledge and the Tree of Life, into the Great Rhizome was put forth (fig. 10).[108] Both are references to the trees that were planted in the Garden of Eden, but the tree of life can also be interpreted as a reference to Charles Darwin using it as a simile to describe the evolutionary bond of beings belonging to the same class.[109] By combining this tree of life with the one of Knowledge where the biblical Eve took the apple, the artists show a relation between our conception of the origin of life and the research on genetic heritage. As the project developers stated, the seed from this apple was the origin of the Second Genesis.[110] Relating this with their faith in what they call New Universalism, in which all humans are considered the same due to their genetic linkage, they thus draw a line between the impact of Christian ideology on the western idea of existence and the current effects of genetic research and its operational norm that is infiltrating human bodies while taking away its autonomy.[111]

A comparison like this – between religion and biotechnology – is part of a methodology CAE often applies in its writings and art projects, as a means to quickly come to a point in which they favour the grander message to providing detailed evidence for their claims. They found inspiration for this form of rhetoric from the writings of cultural theorist Paul Virilio, whose theories can be recognized in the work of CAE more often.[112] Virilio for example states that the comparison with religion is significant in the attempt to understand technology's fundamentalism; it is namely key to develop a balance of knowledge about the

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[106] Critical Art Ensemble 2008, 536.
[107] Critical Art Ensemble 2008, 540.
[108] Critical Art Ensemble, Web. 16 Apr. 2016 <http://critical-art.net/Original/cone/coneWeb/scripture/popb.html>.
[109] "As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever-branching and beautiful ramifications", see Darwin 1872, 105.
[110] Critical Art Ensemble, Web. 16 Apr. 2016 <http://critical-art.net/Original/cone/coneWeb/false/pop.html>.
[111] For New Universalism, see Critical Art Ensemble, Web. 16 Apr, 2016 <http://critical-art.net/Original/cone/coneWeb/mission/pop.html>.
[112] McKenzie 200, 141.

two "to remain free vis-à-vis technology".[113] So, when CAE/Vanouse/Wilding make a comparison between the soul in Christianity and DNA in the current scientific discourse, they show that both concepts are understood as that what is essential to human existence and connects us all together.[114] It is through the means of the creation of the *Elixir of Eden* that the artists underwrote this connection: making in Eucharistic manner their audience drink the transgenic beer containing the genome of the New Eve, the human body is literally invaded by the Human Genome Project that is constructed as means to understand the code of the Homo sapiens (fig. 11). This way, CAE, Vanouse and Wilding discuss how science, in similar fashion like religion, attaches the human biology to the cosmos and thus the 'natural' political laws that are derived from it.[115]

Ironically referring to the supposed objectivity of genetic research and the rhetoric of Christian dogma they expose the cracks in dominant paradigms. It is the quest for technology's original sin, its accident within, that will reveal technology's true meaning in our contemporary society, as Virilio states.[116] Accidents are inherent in the system, whether it is a metaphysical system or a physical one, but when they occur and how they disrupt the temporary harmony is something that can be partly influenced. The creation of a new system is thus what is in the hand of the parasites, as well as the oscillation between harmony and disharmony that defines the whole.[117] Cluck calls this parabiopolitics, when a parasitic epistemological practice disrupts a harmonious system in order to explain what is happening alongside of it, what the mechanisms of biopower are behind its truthful appearance.[118]

Accordingly, *Cult of the New Eve* is a tactical manoeuvre of artists who attempt to critically alter the hierarchy of epistemic institutions. By taking in the place of a DIY practice, the developers of the project emphasize the importance of researchers who are excluded from the scientific dominion. Yet, because the CAE, Vanouse and Wilding use a cult to make the metaphor of biotechnology as religion, they distance themselves in fact too much from the actual scientific world. A cult – an extreme and highly unpopular branch of the religious world – does not reflect the ambiguity of a discourse that is both good/productive and bad/destructive, so *Cult of the New Eve* appears a comparison that is taken too far to truly be considered serious. Being unmistakeably overcritical, and not acting

[113] Virilio reflects on technological culture within modernism and hypermodernism in an interview taken by media art theorist John Armitage, see Armitage 2001, 35.
[114] Critical Art Ensemble 2000, 169.
[115] Critical Art Ensemble 2000, 167.
[116] Armitage 2001, 154.
[117] Serres 1982, 52.
[118] Cluck 2016, 53.

from within, their project misses the chance to be truly parasitic. In this case, the accident happens outside the system. This way they appear unable to contribute to an epistemological shift.

All in all, we can say that on account of the projects' discussion of biotechnological discourse that the opening up of intersubjectivity is that what makes other knowledge producing practices possible. This is exemplified by Serres' theory of the parasite and Virilio's accident, that provide us concepts that are of use to understand the implication of biotechnological conduct and its connection to society. The seemingly negative, destructive parasite points out to be a positive, constructive force, and in the same manner the workings of art can be understood. Even though the art projects of Cohen and CAE/Vanouse/Wilding appear to lack some engaging elements, their topics and – not always successful – workings do show us the significance of art. They discuss how a practice-based disruption from within can be fruitful to open up scientific dogma, and while they do not do it themselves, we shall see in the next and last chapter that certain art forms indeed have this force of bringing about change. For now we can say that an artwork's concept can reflect on the discourse itself, but the introduction of a parasitic element is needed for the disruption that launches a perspective to a whole new level.

Chapter 4 THE POSTHUMAN

In previous chapters I addressed a selection of issues that are of importance in the debate of the posthuman triggered by the CRISPR technique. When reflecting on art's ability to provide insight on hidden forces, I concluded that Stelarc and Zaretsky show us how their affective art brings us closer to the relational core of desire. Following that, the artworks of Cohen and CAE/Vanouse/Wilding informed us that the foundation of our physical state is relational as well, and how the inclusion of parasitic elements in their works opens up the rigid construction of biopolitical discourse. These lasts two projects unfortunately lacked in the triggering power of affect, so they solely lingered on a poetical and critical reflection of biotechnological progress while refraining from the intimate engagement of their audiences. When it comes to CRISPR itself, we can say that the technique gives rise to the idea of an altered state of the human, on which people appear to have conflicting standpoints as I discussed in the first chapter. The way we understand this posthuman being is strongly related to what we can imagine it to be; it links with what we already know, want or fear. But since prediction hardly ever comes a 100% true, we can say that the posthuman is an abstract figure that is partly concealed from our cognition at this moment.

The notion of affect, as showed in the second chapter, can tap into the potential of being, and through the concept of the parasite it became clear that every entity is a somewhat mouldable construction of multiple others. Along these lines, the next step to logically take appears to be in the direction of a future entity that lies in the unknown. So by focusing on artworks that play with different aspects of a posthuman condition, or an other-than-human relationality, I hope to show how art's captivating force can connect us to the basis of CRISPR's possible inclinations. For this I will refer to the work *Embracing Animal* of bioartist Kathy High and on *Natural History of the Enigma* by Eduardo Kac, which are two projects that I recognize as crossovers to a new understanding of biological identification. In both these works the artists include nonhuman life forms that they relate to their own individuality. The posthuman concept that consequently will structure my last chapter is closely related to the earlier discussed posthuman of Rosi Braidotti, and will be associated with Andrew Lapworth's notion of relationality, which will be round up in the short discussion of the theory of agential matter by Karen Barad. Finally, what stands at the core of this all is how I believe art helps us in developing a material based understanding of a performative being in the world.

Strange Kinship

As said before, Rosi Braidotti asked in het book *The Posthuman* for a language through which we can understand a post-anthropocentric form of subjectivity, and this language should according to her be guided by imagination and critical intelligence.[119] General as such a request may seem, in such a phrasing she does draw attention to experimental ways of engagement that perhaps go against the accepted and established values we use in contemporary scientific research. While Braidotti doesn't discuss in depth the specific methods through which such discourse could be constructed, there are some concepts that might be of use in this formation. For instance, the seemingly irrational qualities of artistic conduct that may influence its subject personally and physically, like "ambiguity, complexity, disturbance, unsettlement and imbalance", might be an answer to the need for this new language.[120] Braidotti's claim is that it is "the inhuman nature of the art object" evoked by its "non-functionalism and ludic seductiveness" that places art in line with the posthuman thought, since it is "transposing beyond the confines of bound identities".[121] It is by the engaging act of art that drafts upon the abovementioned troublesome characteristics that the inhumane in its relational subject is enticed through self-doubt when he or she is confronted with the uncertainty of his/her own life. Exactly, and perhaps luckily, the aesthetically enticing side of art that makes it so persuasive; the viewer of the artwork can encounter their unsettled existence while being captured by the sensorial play that is brought about. His or her self-image is in this way quietly questioned in the artwork's environment.

Specifically Kathy High's (b. 1954) *Embracing Animal* employs this seductive uneasiness as its affectual move, which she executed into two parts between 2004 and 2006. The American artist first invited three 'resigned' laboratory rats into her home to come and live with her, and after their death she later on repeated the same act with three other lab rats to incorporate and house in the exhibition *Becoming Animal* of Massachusetts Museum of Contemporary Art (fig. 12). In this latter situation, she has built a residence for the rats to reside in during the whole duration of the exhibition, while the employees of the museum took care of the rodents during and after the opening hours (fig. 13).[122] Throughout her whole oeuvre High often worked together with animals to research the symbiosis with her non-human companions and find out how interspecies existence can be understood. In situation of

[119] Braidotti 2013, 82.
[120] Zwijnenberg 2014, 140.
[121] Braidotti 2013, 107.
[122] High, Web. 6 May 2016 <http://kathyhigh.com/project-embracing-animal.html>.

Embracing Animal she chose to work with rats because of two important reasons: her fear of and severe dislike towards rats and their nauseating effect on her, and the fact that these specific rats were raised as genetically engineered laboratory animals.[123] The way these rats were genetically altered is where High finds the most meaning; the rats were thusly made that they suffered of an autoimmune disease, almost similar to the one the artist herself suffers from as well. Her partial similarity with the animals while at the same time feeling disgusted by them underlines the project's ambiguity. The personal struggle the artist experiences with her own biology appears even harsher and confronting when she takes care of the ill animals that were created in the name of research on autoimmunity. When referring to the project as "a process of empathy, and identification, and […] a gesture of revolt [that] honors our confused relationship", High creates a phenomenon in which she is affected by the rats and the rats by her, to subject both their identities to change.[124]

In general, rats are understood as parasitic entities. In the history of mankind they were the ones who spread diseases and plagues through human population, so that in Western societies they have been considered more dangerous and unfavourable than anything else. As a reaction to biological threats like the ones rats bring about, the immune system of the human body is built to destroy viral intrusions. Within one's blood, white blood cells are attacking and 'killing' harmful alien bodies, and danger is thusly averted. However, in the case of an autoimmune disease, the white blood cells are attacking the non-alien substances and tissues that are normally present in the body. In other words, a reversed working of biology is at play. When the autoimmune disease sufferer High thus decides to take care of rats, which usually would be considered as bringers of alien invasions, she is turning the system of immunity around. Namely, as mentioned in previous chapter, the connected self is reinforced when two bodies are in a closer and intimate relation. So through her relation with the rats, the artist's autoimmune system can now metaphorically target the dangers the rodents could bring with them. Additionally, these dynamics become even more complex when we consider the autoimmunity diseases the rats themselves also possess. When High thus embraces the animals, she is embracing a paradox.

This ambiguous relation can be understood from the theory of habit disruption. Geographical scientist of history and culture Andrew Lapworth discusses this in his paper 'Habit, Art, and the Plasticity of the Subject. The Ontogenetic Shock of the Bioart Encounter'

[123] High 2008, 465.
[124] *Ibidem*, 471.

(2015). According to him, habits are not trivial mannerisms of people, but are part of our identity. Deconstruction of the habit will thus lead to an ontogenetical change of its subject. Following theories of Ravaisson, James, Deleuze and Massumi, Lapworth states that the subject is constructed through habits and should therefore be understood as the material result of an ongoing "process of becoming".[125] Habits are actions that passively and unrecognized actualize its material counterpart and are thus the producers of relational subjectivity, since the subject is placed in a "nexus of relations with other bodies […] and an associated milieu".[126] Lapworth furthermore states that encounters – specifically – with art have the ability to interrupt habits by experiences of affect on the body, and are therefore part of the production of subjectivity.[127] So, when we consider *Embracing Animal*, High is underlining the fragility of immune systems and the culture that is structured around it. She is disrupting the way of thinking about or behaviour towards rats, and for this matter, temporally the habits surrounding parasitical discourse are undone. Much like previously discussed Serres' parasite, High's embrace of the biotechnologically altered rodents she initially so disliked consequently produces a changed form of subjectivity of both rat and human.

Following from this extension of the unified subject, High's project presents us an amiable approach towards the biotechnologically engineered than the conventional position of genetically engineered subjects in research. Like the rats of *Embracing Animal*, the posthuman figure is not as alien as it would seem from High's perspective, but something – or someone – that exists within the flow of mutative life. It is not the alien other, but our shared kin. The artist thus empathetically pushes us towards the call of Bruno Latour to take care of our technological monsters and to become "ever-more attached to, and intimate with, a panoply of non-humans" as a countermovement against the tendency to distance ourselves from the 'horrors' we created.[128] While the CRISPR'ed posthuman is not in existence yet, the technology itself is and should therefore be acknowledged as part of the "condition and foundation of culture" instead of posing it as something that is positioned against (human) culture and nature.[129] High shows us that it is not about a blood link between two entities, but about recognizing the shared embodiment between two nonrelated beings as a "strange kinship".[130] And it is this strange kinship that has a place in *Embracing Animal* that makes

[125] Lapworth 2015a, 86.
[126] *Ibidem*, 91.
[127] *Ibidem*, 92.
[128] Latour 2011, 22.
[129] Zylinska 2009, 44.
[130] Aristarkhova 2010, 8.

High's art so very different from conventions in the Life Sciences, in which the autoimmune lab rat is perceived as an isolated object.

Matter As Active Agent

Kathy High's project draws much of its strength from the relationship between the artist and the rats based on their shared biological aberration, but falls somewhat short in the personal engagement of a wide variety of audience members. Often, people in fact do not have an autoimmune disease and are thus not daily confronted with the workings of their immune system, so for that matter they miss a substantial intimate relation with the piece that otherwise should otherwise be experienced as sensationally affective. Their experiences could be demanding of a more direct format. For that reason, I would like to reflect on a last artwork in which the luring in of 'strangers' by a confronting realization of a strange kinship is apparent, which will play a key part in our understanding of the posthuman. That is Eduardo Kac's (b. 1962) *Natural History of the Enigma*, a multidisciplinary project that the bioart 'pioneer' realized between 2003 and 2008. Like in all his projects, Kac aim is to investigate the philosophical and political dimensions of communication processes, especially with an interspecies approach.[131] Here he created a transgenic plant he called *Edunia*, a 'hybrid' between a petunia and his own DNA, as a means to underline the contiguity of life between different species (fig. 14). To realize this, he isolated a gene of his genome that would produce a protein meant for the identification of foreign bodies, and attached this to a promoter that would steer the expression of this gene solely in the cells that are developed in the red veins of the flower petals.[132] He then proceeded to grow the plant and presented this in an exhibition together with a collection of lithographs, seed packs, watercolours, photographs and a large sculpture called *Singularis* that was based on the protein's shape used in the procedure to create *Edunia* (fig. 15).

Because of Kac's phrasing that make it seem that his genes are the cause of the red veins of Edunia – which is not the case –,[133] and the use of the term hybrid while his DNA makes up for less than 0,003% of the plant's total genome – in biology a hybrid should be a true mixing of parts – his project has received some criticism from the community of the Life

[131] Kac, Web. 1 May 2016 <http://www.ekac.org/kacbio600.html>
[132] Kac, Web. 30 Apr. 2016 <http://www.ekac.org/nat.hist.enig.html>.
[133] "The Edunia has red veins on light pink petals and a gene of mine is expressed on every cell of its red veins", see Kac, Web. 30 Apr. 2016 <http://www.ekac.org/nat.hist.enig.html>.

Sciences.[134] The claims he appears to make don't reflect the standards used in scientific discourse and appear therefore to communicate exaggerations, or simply lies. But the strength of Kac's project should not solely be found at the factuality of his accomplishment. While the visible veins in the flower petals are inherent to the plant's phenotype, by drawing attention to the relation between Kac's own blood – the expression of his used genetic sequence is part of his Immunoglobulin light chain – and the vernacular system of the plant, the main point that is put forth is about the shared systems and forces that give shape to organic life. Both plant life and animal life have vascular systems that function as the infrastructural way of transferring substances taken from the environment needed for the maintenance of the organism's life. Simply said, these are systems that give shape to the interconnectedness of the body. It is what visually relates to Braidotti's definition of the 'body-machine': the "embodied affective and intelligent entity that captures processes and transforms energies and forces".[135] And while this awareness of such a resemblance between the vascular systems can theoretically be known, it is the knowledge of the synthesis between Kac's gene and the plant's genome that shows the ability to result in a bodily response of the art audience. Especially when the artist is present in the space where the plant is placed, like the photo of Kac watering his plant eerily points out, the confusing situation becomes apparent. Because it is a plant, one of the life forms that differs strongly from the characteristics and values we connect with human existence, the weirdness of it all is underlined.

Following this is the importance of the plant-like physiology of *Natural History of the Engima*. During the first exhibition of the project in the Weisman Art Museum in Minneapolis in 2009, Kac distributed amongst his audience plant seeds that he packed together with informational lithographs (fig. 16). With this move he had the intention to make room for a future in which his *Edunia* would be grown by other people so the new plant life would start to live a life on its own outside Kac's power. The plant would make new seeds, and can thus keep on living long after the artist's initial project. The spreading of his seed indicates thus the continuation of life stemming from a once seemingly fixed individual that extends beyond the bodily confinement of this subjects' body. It implies the always-present inclination of death of the living entity, the end of a deceivingly stable configuration. Understanding existence as an individual lifespan that is fixed between the moment of birth

[134] Chamovitz, Web. 1 May 2016 <http://whataplantknows.blogspot.nl/2012/07/enigmatic-petunia.html>. Chamovitz does however acknowledge the differences between the meanings of 'hybrid' in the field of biology and in the field of art.
[135] Braidotti 2013, 139.

until the moment of death is just one way to approach life; it could also be understood as a small part in a much bigger and complex idea about existence, in which its continuation is structured by generation after generation, biologically reacting to and exchanging with the environment. Kac enables his audience to see from this point of view when distributing his seed. And it is in fact an awareness like this what is needed when Braidotti calls for an ethical life that is based on the rejection of false narcissistic pretences and preferences to values related to our own mortality and instead for a appreciation and expression of the autopoietic cosmic energy called *zoe*.[136] That sounds like an admirable statement, but unfortunately also easier said than done. The artist, however, indeed makes the plant relate physically to something other that it's own bodily confinement and its own life, much like a parental situation, but then enlarging it by the extension to other forms of being. His seedy distribution does place the petunia plant in the position of agency, for which the audience is consciously activated and therefore placed into the position to decide what to do with Kac's partial 'life'.

Accordingly, when we zoom in again, into this enormous flow of life, and focus on the different parts that give shape to it, we see how the artist's seed takes in the material shape of what Lapworth calls "emergent and metastable syntheses of pre-individual singularities".[137] Namely, by following Simondon's concept of the individual as always-in-becoming, Lapworth claims that the individual life is not a stable and primary being, but a "'partial resolution' to an encounter between disparate forces and potentials that comprise the energetic milieu of the pre-individual".[138] By this Lapworth refers to the presence of creative events that come into play in certain encounters, "constituting 'points of inflection'" around which a new dimension that establishes the individual is formed.[139] Kac's work exemplifies this. That is, a seed should be understood as an entity of potential: the product of another that is not yet fulfilled. It is the point that is positioned in the middle of a field consisted of forces from which the subject will emerge: existing in a state of tension for which one drop of water could trigger it into the next configuration. By genetically engineering the petunia and thus penetrating the seed's structure, Kac's interrupts the plant's conventional, temporary balanced processes of individuation, leading to a new manner of making sense of its ontology.

In this fashion, the works of Kac provides us a conceptual enrichment of the human

[136] Braidotti 2013, 135.
[137] Lapworth 2015b, 7.
[138] *Ibidem*, 8.
[139] *Ibidem*, 8.

condition. The rigid understanding of human change as linear is temporarily broken in the confrontation with the other-than-human artwork. Instead, what happened is that the awareness and handling of Kac's genetically engineered petunia seeds provide a new dimension to our understanding of identity and connectivity. The effect of such 'epiphanic' experience will ebb away after some considerate time, but as Lapworth says it is that such interruptions are like "incipient forces festering with pluripotentiality that may, under new circumstances, jump from below the thresholds of articulation and consciousness into new and creative adventures of thought, desire, and action".[140]

What *Natural History of the Enigma* thus shows us is that at the core of art's force stands its materiality as that what actively affects the viewer. Namely, by having Kac's seed in possession and having to decide what to do with it, the audience was unable to do anything that is not meaningful. The matter is forming them, and they are forming the matter. In the same line of thinking, feminist theorist Karen Barad argues that we should move away from the dichotomist understanding of life as consisting of "representations on the one hand and ontologically separate entities awaiting representation on the other" that leads to a harmful overvaluing of language, and instead understand the discursive nature of matter as agency.[141] It is a posthuman notion of performativity in which *all* material bodies are incorporated that is needed to develop an "understanding of the precise causal nature of productive practices that takes account of the fullness of matter's implication in its ongoing historicity".[142] This means that our discursive practices as a means to deal with the world are causally related to the material phenomena that we experience. These phenomena are not separate objects outside of an observing subject, but are specifically constitutive of each other; phenomena that *only* get shape and definition in the "intra-relation" with other phenomena.[143] For this reason they are the creators of reality, which is a dynamic progress "through which "mattering" itself acquires meaning and form in the realization of different agential possibilities".[144] In short, it's artworks like Kac's that is necessary in the discussion of the implication of posthuman subjectivity, because they are the ones who bring us in contact with processes of discursive conduct and are able to alter its course by the effects of their own materiality.

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[140] Lapworth 2015a, 97.
[141] Barad 2003, 807.
[142] Barad 2003, 810.
[143] *Ibidem*, 815.
[144] *Ibidem*, 817.

An artwork that addresses the concept of the posthuman is not an end in itself, but a means to come to a more well round grip on contemporary existence. For that matter, the notion of posthuman is a material agent reconfiguring the world. What we make of its material discussion is thus significant to the future path we will walk and an essential contribution to the theoretical discussion of its implications. Namely when High and Kac try to discuss a posthuman condition in which the human boundaries are remade and connected to other forms of life, and entice feelings of discomfort and uncertainty in their audiences when doing so, they open up the rigid predefined concept of posthumanity that would otherwise steer us to solely one path. Since discourse is what "constrains and enables what can be said",[145] bioartistic conduct can thus enable that what through other practices cannot be known, that what is yet to come.

[145] Barad 2003, 819.

CONCLUSION

In this thesis I set out to discuss the way art can be fruitful to the conversation about human enhancement that is sparked by the technological development of CRISPR. I argued that the six different art projects in this paper make clear that our existence is in its core relational and that this awareness is of importance to an alternate scientific attitude. Whereas in daily life things and phenomena are often treated as separated but clearly defined and therefore understandable entities, here the complex and muddy notion of intersubjectivity as a process of becoming is centralized. It is true that operations of specialization and disciplinary discourse have been fruitful to science for many decades, but we have seen that this also comes with a price: the price of a stalemate position in issues that are concerned with complex philosophical questions about the meaning and evaluation of life. Technologies like CRISPR show us the necessity to understand existence in a different manner than in an easy digestible ontology of differences, in order to resolve the incommensurable positions that many great minds take in.

In the four chapters of my thesis I argued therefore that the direction we should follow is one that is concerned with the relationality of being. Academic approaches from researchers like Rosi Braidotti, Brian Massumi, Michel Serres, Andrew Lapworth and Karen Barad show the many different ways relationality can be understood and what effect it has on our conception of life. However, since they are all active within a theoretical framework, their revolutionary theories are mostly concentrated on a level of abstraction. A fruitful translation to daily life remains in the distance. Luckily, certain forms of art have the ability to take in the middle ground between thinking about relationality and experiencing it.

It is Stelarc's work that shows how a sensational experience of art can bring, through the affective forces of technology-based matter, the viewer in a state of awareness of interconnectivity. This is something we can understand as an experience of the potentiality of all relations to other agential matters – bodies, technologies – and how they constitute each other. The notion of desire stands at the centre in this discussion due to the possible realization of advancements that CRISPR enables. Since desire is in its core relational, we can get a sensation of the relations that constitute multiple desires through the experience of affect. It thus exists as a relational force, and in Zaretsky's work it became clear that desire's relational force is affected by a confrontation and flirtation with destruction. For the consideration of multiple standpoints, we should therefore be placed in the virtual, there

where incommensurable and paradoxical positions like life and death exist, in order for us to understand out desires. The activation of these drives by simultaneously speaking to our aversion is what makes the affect that is brought about by art so successful.

In the discussion of Cohen's and CAE/Vanouse/Wilding's works we saw that relationality also has a strong social significance. Specifically, we share genetic and other biological material and information with others, so every decision taken regarding a person's biological state influences multiple different biological states. Sometimes the implication of this can be missed however, when identity is represented in society as something that is confined in the single body. In *Genetic Heirloom* the connected self was conceptualized in the topic of genetic heritage, and in *Cult of the New Eve* the societal significance of DIY practices is touched upon. In the end, both pieces turned out to be too speculative or too extreme to bring about a state of sensation. Nevertheless, they did prove to show the importance of a disruptive element in current ideas about science, social relations and kinship and how cultural embedded constructions like these are always subjected to change as well. This disruptive element is what Serres would call the parasite, or Virilio the accident or Lapworth the artistic interruption of habits, and they all are reminiscent of a break in a supposedly fixed system that enables the understanding of a primal relational structure. Art breaks through established organizations and proves that they are not static, but in fact like dried mud waiting for some water to make it mouldable.

This does not mean that this promising aspect of art to bring about change is making it useful as a propagandist tool. It won't steer the masses in a certain direction, but acts solely in the intimacy of a personal experience. Change can only be found in the sudden awareness of the mechanisms of subjectivity, and this experience behaves more like a loose canon than a teaching method. In the paradox of High's project the disruption of the production of subjectivity is based on feelings of repulsion and reluctance in which no resolution is given, whereas in Kac's work it is taken one step further by showing that the materiality of art is constitutive of our idea about subjectivity; here the active agency of matter in the creation of our identities stands at the core. The artworks show us that existence is relational, and that the different elements in this complex structure of relations are all subjectively operating.

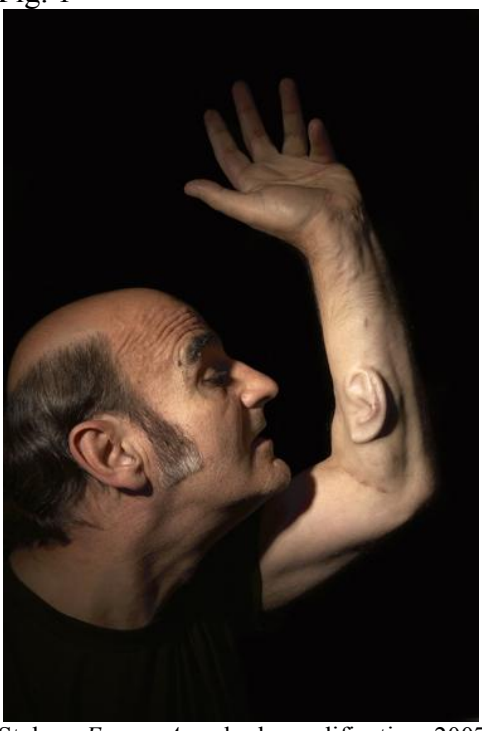
The incorporation of art in discussions about technological innovations like CRISPR finds therefore its significance in a focus of inclusion in contrast to methods of exclusion. The diverse viewpoints that are present in the human enhancement debate exemplify that finding the right definition of what is at stake sometimes cannot be achieved through language and representations. Instead, it has to be known through an affective happening in

which different desires, implications and heuristic models all find their affirmation. Art has the ability to confront someone with his or her own fluctuating and unclear existence, not with the attempt to eliminate it, but to enforce it.

One might argue that there are still issues in this theory that need further elaboration. For instance, one of the biggest questions might be how these illuminating experiences of art will affect different audiences. What kind of impact will art's knowledge-producing dynamic have on scientists working with CRISPR and what will it say to those from the field of applied bioethics? Even though the varying people making up the artworks' audiences are constituted by shared relationality, each kind of potential transformation an individual spectator can undergo remains unique and dependent on the specific person, and cannot be truly anticipated. Be that as it may, we can say that the groundwork for an epistemological shift has been laid. The interdisciplinary practices of bioart are able to bring forth new ways of understanding human and posthuman existence. Scientific research acknowledging this new perspective can only benefit from such affective agency, because practices triggered by art's changing matter determine what it is we can see. They are the phenomena by which the world is formed.

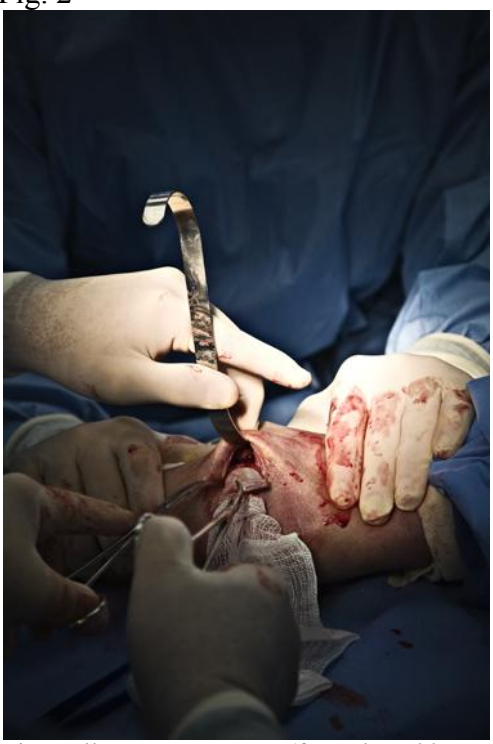
ILLUSTRATIONS

Fig. 1



Stelarc, *Ear on Arm*, body modification, 2007-present. Photograph by Nina Sellars. Web. 21 Mar. 2016 <http://stelarc.org/?catID=20242>.

Fig. 2



Nina Sellars. *Injector Port* (from the *Oblique. Images from Stelarc's Extra Ear Surgery* series), photograph, 163 x 108 cm, 2006-2008. Web. 21 Mar. 2016 <http://stelarc.org/?catID=20242>.

Fig. 3

Adam Zaretsky, *MicroSushi, Microinjection Food Science*, performance, four Flying Fish eggs (Tobiko), sterile solution of Gelman filtered Philadelphia Cream Cheese, sterile solution of Gelman filtered wasabi (horseradish paste), diameters ranging from 0.072 cm to 0.138 cm, 2001. Photographer unknown. Web. 21 Mar. 2016 <http://emutagen.com/mcinject.html>.

Fig. 4

Creator unknown, *Micrograph of the actual microinjection*. *MIT 2001,* micrograph, dimensions unknown, 2001. Web. 21 Mar. 2016 <http://emutagen.com/mcinject.html>.

Fig. 5

Revital Cohen, *Disclosure Case* (from the *Genetic Heirloom* series), Pear wood, glass, resin, gold plated brass, powder coated steel, acrylic tubing, 32 x 23 x 30 cm, 2010. Photograph by Gary Hamill. Web 2 Jun. 2016 <http://www.cohenvanbalen.com/work/genetic-heirloom#>.

Fig. 6

Revital Cohen, *Interventionist Healer* (from the *Genetic Heirloom* series), Glass, gold plated brass, nylon, vinyl tubing, leather, powder coated aluminium, 60 x 37 x 30 cm, 2010. Photograph by Gary Hamill. Web. 2 Jun. 2016 <http://www.cohenvanbalen.com/work/genetic-heirloom#>.

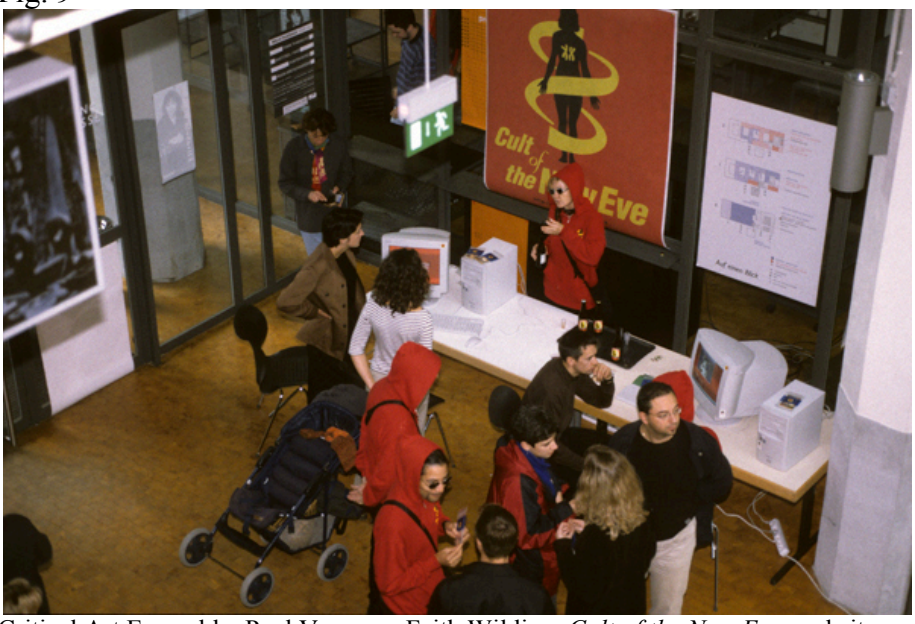
Fig. 7

Revital Cohen, *Guilt Adjuster* (from the *Genetic Heirloom* series), glass, painted nylon, colloidal gold, vinyl tubing, gold plated brass, 40 x 30 x 30 cm, 2010. Photograph by Gary Hamill. Web 2 Jun. 2016 <http://www.cohenvanbalen.com/work/genetic-heirloom#>.

Fig. 8

Critical Art Ensemble, Paul Vanouse, Faith Wilding, *The Woman Clothed in Cathode Rays* (from the *Cult of the New Eve* series), illustration, dimensions unknown, 1999-2000. Web. 2 Jun. 2016 <http://critical-art.net/Original/cone/coneWeb/scripture/popb.html>.

Fig. 9



Critical Art Ensemble, Paul Vanouse, Faith Wilding, *Cult of the New Eve*, website, performance, mixed media, 1999-2000. Performance at Center for Art and Media, Karlsruhe, 2000. Photorapher unknown. Web. 2 Jun. 2016 <http://www.critical-art.net/Biotech.html>.

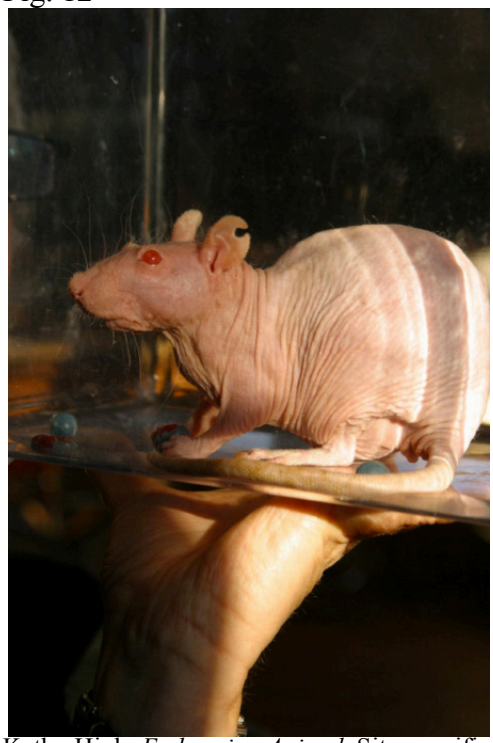
Fig. 10

Critical Art Ensemble, Paul Vanouse, Faith Wilding, *Vision of the Sacred City* (from the *Cult of the New Eve* series), illustration, dimensions unknown, 1999-2000. Web. 2 Jun. 2016 <http://critical-art.net/Original/cone/coneWeb/scripture/popb.html>.

Fig. 11

Critical Art Ensemble, Paul Vanouse, Faith Wilding, *Elixir of Eden* (from the *Cult of the New Eve* series), transgenic beer, wafer with genome, dimensions unknown, 1999-2000. Photographer unknown. Web. 2 Jun. 2016 <http://www.critical-art.net/Biotech.html>.

Fig. 12



Kathy High, *Embracing Animal*, Site-specific, mixed media installation with glass tubes, video, sound, live transgenic laboratory rats in extended rat habitat, computer terminal with website, dimensions unknown, 2004-2006. Exhibited at *Becoming Animal. Contemporary Art in the Animal Kingdom* of Massachusetts Museum of Contemporary Art. Photographer unknown. Web. 2 Jun. 2016 <http://www.embracinganimal.com/installation-views.html>.

Fig. 13

Kathy High, *Embracing Animal*, Site-specific, mixed media installation with glass tubes, video, sound, live transgenic laboratory rats in extended rat habitat, computer terminal with website, dimenions unknown, 2004-2006. Exhibited at *Becoming Animal. Contemporary Art in the Animal Kingdom* of Massachusetts Museum of Contemporary Art. Photographer unknown. Web. 2 Jun. 2016 <http://www.embracinganimal.com/installation-views.html>.

Fig. 14

Eduardo Kac, *Natural History of the Enigma*, transgenic flower (petunia), dimensions unknown, 2003-2008 (Minneapolis, Weisman Art Museum). Photograph by Joy Lengyel. Web. 2 Jun. 2016 <http://www.ekac.org/nat.hist.enig.html>.

Fig. 15

Eduardo Kac, *Singularis* (from the *Natural History of the Enigma* series), painted fibreglass, metal, 436.88 x 619.76 x 256.54 cm, 2008 (Minneapolis, Weisman Art Museum, inventory number 2010.32). Photographer unkown. Web. 2 Jun. 2016 <http://www.ekac.org/nat.hist.enig.sculpt.photos.html>.

Fig. 16

Eduardo Kac, *Edunia Seed Packs* (from the *Natural History of the Enigma* series), paper, Edunia seeds, magnets, six pieces each 10.16 x 20.32, 2009 (Minneapolis, Weisman Art Museum). Photograph by Rik Sferra. Web. 2 Jun. 2016 <http://www.ekac.org/edunia.seed.packs.html>.

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