

# The Bio-art Awards

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The real goal of bio-art according to today's bio-art competitions



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## Introduction

Over the past 50 years science and technology have changed every aspect of our lives, from health to work to society. These developments in the life sciences generate all sorts of new concerns. Therefore it is considered important that communication between the life sciences and society leans on an effective type of mediation. Artistic mediation has been advocated because art involves people emotionally, and activates processes of dialogue and participation (Crettaz van Rooten 7). During the late 20th and early 21st century, exchange projects between artists and scientists have become more common and we have seen an increase of organizations that stimulate and initiate collaboration between artists and scientists (Reichle 13). These collaborations have brought us beautiful and interesting examples of bio-art but there is also a lot of scepticism about the equality between the two sectors.

The question is what do they have to offer each other? In most collaborations the central question is what has art to offer science?<sup>1</sup> The answer is often to help society understand or become critically aware of the implications of science or to help society reshape culture in the face of technological developments. For art, it is mostly described as the chance to gain inspiration from science's insights into the natural world and have greater access to equipment and resources (Zwijnenberg).

There is a long history of narratives that point out the unbridgeable divide between art and science, and an equally long history of narratives that never tire of pointing out their consonance. In the last thirty years there have been increasing collaborations between artists and scientists and the reasons for this are complex and varied. Although the interaction is mostly promoted as a positive activity that is urgent and full of promise, there is a general problem that collaborations may become muddled by different disciplinary understandings. Art can be used by scientists as a way to reach a larger public in the sense of (1) publicly highlighting aesthetic dimensions of their work (2) raising the scientist or instrumental profile (3) acting as a model for communicating science and (4) simply to adhere to certain funding criteria (Boland 37). There seems to be a distinction between bio-art that attempts to challenge the oppressive and exploitative practices that shape the world and bio-art that functions as a form of science-advertisement. Considering these means we should pay attention to the ways in which the arts-science linkage works within our society.

I want to examine this distinction by focusing on the goal of bio-art according to today's bio-art competitions. I will do this by comparing four of the biggest bio-art competitions of which two are located in Europe, one in South America and one in North America: The Bio Art & Design award, the Wellcome Trust Arts Award, the VIDA Artificial Life International Awards and the FASEB BioArt competition. Even though these competitions all focus on art-science collaborations, they have their

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<sup>1</sup> The term science is used here as shorthand for both scientific and technological research

own history and specific vision on what it is supposed to do. The reason I chose these specific competitions is because they are all well-known competitions that represent a different country, a different history and a different vision on bio-art. I will compare their histories, their claimed intentions and their results by answering the following questions for each competition:

1. What kind of competition is it and in what historical and sociological background has it come into existence?
2. With what intention did they set up the competition?
3. How is the competition presented and according to what criteria does the competition choose the winning artworks?
4. What transformations has the competition gone through since it first started?
5. Do the winning artworks reflect the idea that the competition claims to strive after and in what way is it a reflection of their idea of good bio-art?
6. How much do their works contribute on the technological and scientific level, how much on the artistic/aesthetic level and how much on the conceptual level?

By answering these questions I hope to create a complete overview of the competition and the role that it is playing in the world of bio-art. The distinction that I mentioned before between critical bio-art and bio-art that is used as science advertisement is one that is often made. I'm going to use this distinction as a framework to categorize the different bio-art competitions in this thesis. It is, however, a rather sharp distinction so trying to place the competitions strictly in one of these 'boxes' is probably not always going to be possible.

The reason I chose this subject is because I believe it fits in with the current debates about the urgency and relevance of art in our society and more directly the role of art in the public debate on biotechnology. Why do we consider it so important and urgent for art to play a role in addressing issues and implications of the sciences? The reason for focusing specifically on competitions and awards in this research is because I believe they are interesting cultural phenomena which can tell us a lot about our current situation. They use specific criteria, give clear results, get lots of media attention and since they are organised yearly they can also give a certain chronological overview of the transitions bio-art has gone through. By using them as my research field I believe I can create an interesting insight in what is happening in the world of 'popular' bio-art and its development. It can show us if these competitions stimulate bio-art as being a form of advertisement or a form of critical art, which will hopefully bring us a bit closer to answering the more general question; what do we expect from the collaboration between art and science and why is it necessary?



# Chapter 1. The Concept of Bio-art

## 1.1 Defining bio-art

Bio-art can be considered as a relatively new development in contemporary art that is still at the threshold of definition. The term bio-art was first used by Eduardo Kac in 1997 in relation to his artwork *Time Capsule*, a performance in which a microchip transponder tag was implanted in Kac's ankle (Pentecost 110). (Image 1.1) To him bio-art was the aesthetic manifestation of the contemporary development in which human/nonhuman, and living/machine were starting to erode (Osthoff). The concept of bio-art itself, however, is often linked to two earlier originators. The first was Alexander Fleming (1881-1955) a scientist and the discoverer of penicillin who created the work *Germ Paintings*, in which he made paintings with microbes in 1933.<sup>2</sup> (Image 1.2) Interestingly, these artworks were not displayed in a gallery or a museum but in a hospital. Later, in 1936, at the Museum of Modern Art New York, the photographer Edward Steichen (1879-1973) exhibited a collection of strange yet beautiful Delphinium flowers, which were the result of a chemical experiment.<sup>3</sup> (Image 1.3) In the beginning of the 21<sup>st</sup> century bio-art started to be more widely practiced. In the early cases, the projects and experiments were still mostly judged by their aesthetic criteria but over the years bio-art has gone beyond judgements of aesthetics in favour of more controversial classifications (Stracey 496).

The reason it is hard to find a widely accepted definition of bio-art is because it undergoes constant reconsideration in discussions among its practitioners and theoreticians. Most artists and theoreticians consider bio-art to be an art form that is limited to 'living forms', while others believe that imagery of contemporary medicine and biological research can also function as bio-art. Artists like Eduardo Kac, Ionat Zurr and Oron Catts think bio-art should be 'in vivo' which means that it should be clearly distinguished from artworks that exclusively use traditional media to address biological themes, like paintings or digital photography (Pentecost 110). These conventional art forms are only representations of science and mostly serve to satisfy the demands of traditional art museums (Reichle 24). Most artists and theoreticians that are engaged with bio-art seem to agree with this statement: they believe artists must engage in biology by adopting the approach that is referred to as 'wet engagement' (Zurr and Catts 32).

However, not everybody agrees with this idea that art that represents life cannot be a form of bio-art. Ancient philosophers like Plato and also relatively recent philosophers like Kant and Wittgenstein have always suggested there is a link between ethics and aesthetics (Little 185). According to bioethicist Miles Little this relationship is even more apparent today. The discussions of

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<sup>2</sup> These images were drawn by putting bacteria on paper that was pre-soaked in a culture medium and then incubated.

<sup>3</sup> Steichen dosed the Delphinium seeds in a chemical bath of colchicine, a toxin that induces polyploidy, resulting in the mutated flowers. Notably, ugly, stunted, febrile rejects that also resulted from this art-orientated chemical experiment were omitted from the show, exposing the role of edited selection in bio-art

moral subjects are more and more influenced by images, especially when those images have emotional and aesthetic qualities. These images become ‘tacit knowledge’ that generally has a lot of influence on our approach to ethical issues (Strati 54). Little concludes that ethics and aesthetics not only illuminate one another but in significant ways constitute one another (185). Assuming that these broader considerations also apply to the relationship between art and bioethics, powerful images would have the same ability to influence our approach to bio-ethical issues. W.J.T. Mitchell elaborates on this idea in his book *What Do Pictures Want?: The Lives and Loves of Images* saying that the tactical irresponsibility of installations like Suzanne Anker’s greatly enlarged chromosomes offer us just as much to think about as the ‘wet engagement’ practice of bio-artists (335). (Image 1.4)

Despite many attempts to organize the multiple terminologies around the subject, almost every attempt eventually is problematic in its lack of subject rigour. Although it would be easier to choose one definition of bio-art to limit the subject scope, for this research I will be looking at the different definitions of bio-art given by each of the competitions individually and the way the artworks represent these definitions.

## **1.2 The rise of public engagement**

Even though every competition has its own definition of bio-art and its own idea on what it should do, they all seem to have one goal in common: stimulating public engagement. At least, this is the term that is used in almost every competition’s goal description. Competitions use art as a medium to stimulate public engagement when it comes to science but what does public engagement with science mean exactly? It may seem like a modern preoccupation, but science communication has a long history. Early science communication usually used what is commonly referred to as the *deficit model* (Matterson 6). In this model scientists assume that the public should receive as much information as possible about new technologies and discoveries because the more the public knows the more they will support scientific research and new technologies (Scheufele 21). This model drove communication of science for the last half of the 20th century (Borchelt and Hudson 79). However over time, different researchers and practitioners identified both positive and negative links between levels of knowledge and citizens’ attitudes toward science and most recent literature suggests that simply informing the public does not necessarily change their views (Kearnes et al. 55). This is because people don’t use all available information when forming an opinion about scientific issues; they rather rely on influences such as religious beliefs, ideological assumptions and signals from mass media. The relationship has also changed after people became more aware of factors like scientific authority and the risks that the scientific discoveries carry (Brossard et al. 110). One could say that public engagement has moved to a more developed *dialogue* approach, which involves two-way discussions. The big difference of this approach is the relationship between scientists and the lay public, where it is not only about understanding but also about engaging (Boon 9). Despite its

popularity, the term 'public engagement' doesn't have any widely agreed coherence. For some people it is more general in that it covers the whole spectrum of activities in which scientists interact in some way with people without a scientific background, for others it refers to dialogue, where there is genuine discussion between scientists and the public about meanings and consequences of scientific actions for society; and for some it is more specifically about integrating the public voice into scientific policy making (Matterson 4).

### **1.3 What practitioners and theoreticians see as the main goal of bio-art**

So if 'stimulating public engagement' cannot be considered a comprehensive answer then what exactly does one consider being the goal of bio-art? Starting with the artist that introduced us with the term bio-art: Eduardo Kac. Kac recognizes the role of the natural sciences as very dominant and influential in contemporary culture and it is because of this dominance that bio-artists should get involved. Artists should work with the tools of biotechnology to demonstrate the fragility of the objective authority of science and deepen the insights of critics, historians and philosophers (Kac, *Signs of Life* 3). This way they can claim the task that traditionally belonged to the humanities, which is to reflect ethically on these new scientific advances and search for the boundaries of science and art (Reichle 20). Bio-art should create an autonomous space by finding a fine balance between engagement and critique (Kac, *Bio-art* 28). Oron Catts shares this same vision, according to him there is a misconception about the role of bio-art in society because many people believe that it is based on helping to create public acceptance of synthetic biology. Art, however, is not supposed to make sense of science but critique it (Rearden 1243). Many artists seem to share this goal of creating social reflection and delivering political and societal criticism. According to curator Wythe Marschall bio-art is part of a larger cultural impulse to keep up with techno scientific developments (Walden). Art can give us a critical distance; it creates a space in which we can ask critical questions about the world we live in without having to commit ourselves to a political position. Ethically, artists need to reflect upon these big biology projects, explain them, reimagine them, challenge them and ultimately build sophisticated critiques of them. According to artist, curator and author Frances Stacey, bio-art should not only be critical towards techno scientific developments but towards life in general. Bio-art should show us that life is more than just a bunch of cells or genes. Bio-art should be used as a provocative reminder that how life is modelled and represented matters to how it is valued, used and disposed of. As an example of this he gives Natalie Jeremijenko's cloned *OneTree* (1999), an artwork consisting of 1,000 cloned trees, micro propagated in culture. These cloned trees are biologically identical, but planted in different areas with different soil and climate conditions, reflecting the social and environmental differences to which they are exposed during the years of their growth, exposing the determinations and mutations of life (Stacey 497).

There are, however, also others like Hub Zwart, for whom bio-art is not about criticizing science. The scientific director of CSG and jury member for the Bio Art & Design Award thinks bio-art should explore the field, show snapshots of possible futures and fill the emerging scene with moral question marks (Zwart 49). This way, it reveals important aspects and dimensions of research practices. Thus bio-art becomes a laboratory practice in its own right, often conducted within scientific research settings (48). Zwart sees bio-art as a chance to move beyond the two cultures theorem that has been a dominating power in twentieth century philosophy of art and science (47).

Robert Zwijnenberg believes art should be critical towards science but is sceptical about the position of art regarding science. He refers to the words of Krzysztof Ziarek to express this doubt: “Can art affect the power momentum of the society of which it is itself a product and in which it often plays the function of an aesthetic object and/or commodity, and if so, how can it do this?” (Ziarek 82). Science has such an overpowering position in today’s society, that it can create an uncertain position for the arts. This can surface in two ways according to Zwijnenberg; the dazzled by science trap and the complicity trap. The first problem is that artists can get lost in all the possibilities offered by new technologies and forget about the societal or ethical implications of these technologies. They start playing with these technologies without any sustained artistic focus. The other danger is the complicity trap. The question here is if art should be the one to reassure us about technological developments? For Zwijnenberg, looking at most art-science collaborations, he finds it hard to see the role of art in these projects as being enriching, destabilizing, transforming or complicating the scientific discourse. Artists still lack the ethics and aesthetics proper to their engagement with the sciences and they most often fall back on traditional aesthetic means. Therefore he states that bio-art can only be successful when artists make art that scares and unsettles the scientists, that disrupts them, art that threatens them (Open Wetlab).

## **1.4 Corporate agendas**

There are concerns whether or not there is something to be gained in encouraging artists and scientists to work together, because as illustrated by Zwijnenberg, art or artists can sometimes willingly or unwillingly slip into the zone of glorifying biotechnology (Forster 77). But sometimes it is not the artworks but the exhibition and marketing of these artworks through which certain ideologies and their acceptance into society are being generated.

Various areas of technological innovation are being hyped. This is necessary to convince investors and also the public to take the risk and invest in the revolutionary breakthroughs promised by the developers of the technology (Brown 8). Artists Ionat Zurr and Oron Catts experienced this when they were Research Fellows at the Tissue Engineering and Organ Fabrication Laboratory at Harvard Medical School. As part of the laboratory personnel, surrounded by researchers and scientists, they became more and more aware of their own role as artists within the laboratory. They realized that bio-

artists do not have the same responsibilities as scientists (Zurr 33). Unlike scientists and responsible journalists who are expected to report the truth and support these claims with facts and evidence, the artist is allowed to fantasize and produce unrealistic expectations of science and technology. This makes artists very interesting for corporate interests, because they have the access to the public imagination. Even if this access is small, it is still direct access and creates an opportunity to place full-page advertisements in newspapers and magazines. The access that artists have to the public imagination is called 'modem access'. It is mostly through the curatorial framing of the show like the title, the slogan and the graphic image rather than the actual content of the art. Therefore, the curator has an extremely powerful role when it comes to framing the reception and interpretation of artworks. Considering the powerful role of curators, Natalie Jeremijenko points out that an important part of the story of a bio-art exhibition or competition is understanding who is funding it and why ("A Response to Paradise Now.") It is important to find out what the perceived benefits are of such an exhibition or competition, and to whom they are beneficial.

An example of how it can go wrong is the *Paradise Now* exhibition in 1997. In that year Greenpeace obtained a memorandum written for industry group Europa Bio by Burson-Martstellar, world's largest public relations firm. In this memorandum the biotech industry was discouraged from using traditional PR techniques (Berry 8). They advised the bio-industries that if they wanted to create the desired changes in public perceptions and attitudes they had to stop trying to be their own advocates and start focussing on art and museum shows. These shows are very important in this approach because they are considered neutral ground for organisations that allow them to stay off the 'killing fields' of rational debate (Stevens, "Biotech Patronage" 53). According to artist Natalie Jeremijenko and professor Jaqueline Stevens, this strategy was used in 2000 by the public relations firm NoonanRusso for the American art show *Paradise Now: Picturing the Genetic Revolution* (Pentecost 53). It was the first major exhibition that examined the meaning and implications of discoveries in genetic research (Boland 50). The goal of this show according to its curators was to encourage the visitors to start considering the impact and implications of genetic research and to take a more active role in the on-going dialogue on this subject. They wanted to do this by putting together a show of provocative artworks that would help viewers engage in ideas and issues that were often dismissed as being too complex (Lyrich 184). The man behind the exhibition was Howard Stein, who had joined forces with the sponsors Orchid BioScience, Variagenics, Affymetrix and Noonan/Russo Communications, all described as profit-minded and ideological biotech advocates (Stevens, "PR for the Book of Life"). Stein, who was described by some as the father of the money market fund, was known to invest his money where he saw the government investing (Stevens, "The Industry"). The show was promoted through many billboards and advertisements, which wasn't surprising considering its huge publicity budget of 500.000 dollars. The curators' description of the show as provocative was very much in contrast with the promising statements in the exhibition brochure like: "The major benefits of sequencing the human genome are yet to come" and "Medicine will be transformed,

diagnoses will be refined, and side-effect-free drugs will target specific diseases, working the first time they are administered” (Pentecost 69). While special-interest journals such as *Science News* and *The Sciences* reviewed the show positively, most newspaper reviews were lukewarm. An example is Michael Kimmelmans’ review in the New York Times: “Never mind that in *Paradise Now* the art isn't great, because the possibilities raised are endless, and the numbers, as they say on Wall Street, look good. More and more artists are tapping into science” (Kimmelman). Stein agreed with these reviews, admitting that his show was a “mish-mash of artworks”. According to Stevens this didn’t bother Stein because he was less interested in the show’s content than in desensitizing the audience to its subject matter (Stevens, “Biotech Patronage” 47). The other curators of the show were more defensive of their independence, saying that there were definitely installations that criticized the corporate gene culture. Also they brushed off concerns about Stein’s agenda and conflicts of interest by saying that in the art world Stein was naïve because he really believed art could change people. Apparently the other curatorial firms did not see art as having the ability to change people (Stevens, “The Industry”). A contradicting statement considering one of the organizing premises of the *Paradise Now* exhibit was that art had the potential to effect social change (Lynch 186).

Natalie Jeremijenko called *Paradise Now* a ‘corporate snow job’ and an embarrassment. About her *One Tree* installation in the show, she said; “It doesn’t serve my piece to be framed in this way” (Stevens 46). Even if the curators chose to show art that was critical of biotechnology, she argued, they did so in a carefully choreographed manner combining it with other works that tempered the effect of any criticism (Lynch 186). The reason they wanted this access is because art that is about biotechnology serves to reassure viewers that serious concerns are being addressed. Stevens went even further in her remarks, criticizing not only *Paradise Now*, but any effort to creatively visualize the biotechnological future. She argues that socially critical art always has the potential to serve as a form of ideological containment. The public gets the idea that they have a critical view when in fact they don’t at all. More than this, she suggests that it doesn’t matter if the artwork has a critical edge or not, these speculative visions of scientific and technological futures implicitly help to convince us of the inevitability of such futures. Shocking and disturbing images only help to acclimate the public to this new reality (Stevens, “The Industry”).

## **1.5 Worldly differences**

Howard Stein stated that he and other sponsors supported biotech shows because he wanted to ensure that biotech firms in the United States would avoid the hostility they generate in Europe. They hoped that the show would help biotech companies in the United States and other developing countries to avoid the marketing fiascos such firms have to deal with in Europe (Stevens, “Biotech Patronage” 46). This shows that the relationship between science and the public differs a lot in the different parts of the world. The specific ways the bio-art competitions efforts play out are affected by the different histories

and national political cultures. Therefore it is interesting to pay attention to these differences when looking into the bio-art competitions.

Most Western countries have held surveys or used other research strategies to discover the relationship between science and society over the years. Comparing these surveys both Europeans and Americans seem to have high confidence in science (Einseidel 59). *The Science and Engineering Indicators* published in 2014 showed that the expressed interest in science and technology generally appeared lower in the European Union, where 30% reported being very interested, than in the United States, with 40% reported being very interested. However some countries like the Netherlands (48%) and the United Kingdom (43%) had percentages that were higher than the United States (12). The level of factual scientific knowledge in the United States is the same level as in Europe and is generally higher than levels in countries in other parts of the world. However in recent years there seems to be a significant decrease going on when it comes to the public's trust in science. The *Eurobarometer report on Science and Technology* in 2013 noted that within Europe the majority of citizens feel that "scientists cannot be trusted to tell the truth about controversial scientific and technological issues". The main reason for this given in the report was the increasing reliance of scientists on funding from industrial and private sources but there were also other decisive factors like high levels of media attention for controversial scientific topics such as climate change and genetically modified foods (Bultitude 2). Americans generally have remained more optimistic about science and technology. Their confidence in the scientific community has remained higher than in Europe and other parts of the world like Canada or Japan (*Science and Engineering Indicators 2005* 46).

## Chapter 2. The Bio-art Competitions

### 2.1 Competitions as an instrument of cultural exchange

Bio-art competitions and exhibitions can be considered as two very different concepts. A big difference is that bio-art competitions are limited in the amount of works they can choose from every year while bio-art exhibitions, depending on the theme or thesis, are able to choose artworks from the whole spectrum of existing bio-art. This is why William Myers, author, curator and jury chairman of the Bio Art & Design Award, usually considers exhibitions to be richer because they generally include more work and have the opportunity to mix older and contemporary works together in support of a particular theme (“Interview”) While a competition is usually just a showcase of a few winning projects. This can be seen as a limitation but also as a unique aspect of the concept. What makes the concept of competitions so interesting and valuable for this research?

Competitions and awards are as old as the history of mankind and have always played a central role in our society. This makes them very interesting cultural concepts that carry a certain value and that can tell us a lot about our current situation. During the past century, and especially since the 1970s, cultural competitions have multiplied at a faster pace than our fast-growing cultural industries themselves (Polumbaum 180). According to James English in his book *The Economy of Prestige* (2005) our time is an age of awards in which our cultural universe has become supersaturated with prizes. It’s safe to say that this situation hasn’t changed in the past ten years.

The custom of awarding prizes to artists is a very familiar practice considering its long history dating back at least to the classical Greek drama and arts competitions in the sixth century B.C. It is, however, also a strange one because we continue to be discomfited by the idea of art as a competition from which there must emerge one specific winner. This idea doesn’t fit in the modern ideology of art where the emphasis on winners and losers is out of place (English, *Economy* 2). Artistic projects are by their very nature singular. Rankings among competitors are not unambiguously measurable when it comes to art. Therefore to most people, cultural prizes represent an external imposition on the world of art rather than a true expression of its own energies (Grant and Davis). Still, English describes prizes as one of the most powerful instruments of cultural exchange (*Economy* 12). They reflect a sustained willingness, even an obligation, on the part of journalists and others to accept the implied equivalency between cultural prizes and cultural value, to accept the prizes as a legitimate measure of an artwork’s cultural worth (English, *Winning the Culture Game* 109). Therefore it is important to focus on the specific workings of prizes. Just like exhibitions they have specific machineries of presentation, sponsorship and publicity. The artists, judges and sponsors involved in a prize can be seen as agents, each of them with their own set of complex interests (English, *The Economy* 4).

Even though the cultural universe has become super-saturated with prizes and we are aware that they aren’t completely neutral nor that they always convey expert opinions, they are still very valuable.



Competitions can be seen as a piece of objectified symbolic capital, which has the ability to influence even those of us who are presumed to know better (English, *Winning the Culture Game* 110). This is why I believe that competitions can give us a unique insight in bio-art that is different from other cultural concepts and activities.

## 2.2 The Bio Art & Design Award

The first competition that I will look into is a very diverse competition called the *Bio Art & Design Award*. This award is a relatively new competition that held its first edition in 2010. The award started as the *Designs & Artists 4 Genomics Award* and was set up by the Netherlands Genomics Initiative (NGI) and Waag Society. In 2014 the award continued under its new name *Bio Art & Design Award* when the organisation partnered up with their new research funders ZonMW (Medical Research Council) and NWO (Dutch Research Council – Earth and Life Sciences). It became a product of collaboration between NWO, ZonMW, MU Artspace, Waag Society, Eindhoven University of Technology, and BioArt Laboratories. Despite these new research funders the aim of the initiative stayed the same: “stimulating young artists and designers from the Netherlands and abroad to experiment with bio-art and design and to collaborate with renowned Dutch science centres”. The award aims to manifest the creative potential of the life sciences to a broad audience with projects that demonstrate how bio-art can influence our lives profoundly and change the way we view the world (“Matter of Life Catalogue”). The three awards of 25,000 euros each are handed out by an international jury to the most original and promising proposals in the competition and are then realised within six months and exhibited. According to the competition’s website, the main goals are to:

- stimulate interest, excitement and debate about the life sciences through high-quality, original artistic practice.
- examine the social, cultural and ethical contexts of the life sciences through the arts.
- promote high-quality interdisciplinary practice and collaborations between art/design and science/technology. (Essaïdi, “*Bio-art & Design Award*”)

### Dutch relationship with science

To find out what role this competition plays in the Netherlands it is important to look at the current relationship this country has with the life sciences. Earlier on I discussed the general relationship Europeans have with science. However, when focusing specifically on the Netherlands it is hard to point out how the trust in science has developed because of the lack of solid longitudinal data on this subject (Tiemeijer and De Jonge 59). Because of the speculations of an on-going decline in European trust in science, the Rathenau Institute and WWR decided to conduct a survey in 2012 to discover if this really was the case in the Netherlands. One of the outcomes was that science was chosen as being most trustworthy of all Dutch institutions. However the trustworthiness of scientists themselves seemed a different story. About 50% of the respondents did not agree with the statement that the majority of scientists were honest and trustworthy and about 30% thought that scientists who had a different view were often being silenced. A very small minority believed that universities truly used their power to prevent scientists from committing fraud (Tiemeijer and De Jonge 46). One can conclude that there is a

lot of trust in science as an institution but less in scientists themselves and their professional practices. In *Hoeveel vertrouwen hebben Nederlanders in wetenschap* this is explained using the modernization theory. The theory starts with the knowledge deficit model, which was discussed earlier on in this thesis, in which the social transformation from an agrarian society to an industrial one goes hand in hand with more trust in science, mostly because of an increase in the level of education. However, according to this same theory the transformation of an industrial society to a post-industrial society would lead to less trust in science. In this society one would be critical towards authority and therefore also towards scientific authority. Furthermore society starts seeing the downsides of science and technology because people with a higher education have a better understanding of the risks and shortcomings of scientific discoveries. So in a post-industrial society high education would go hand in hand with a bigger trust issue in science. This specific mistrust seems to have increased quite a lot in the past years (Tiemeijer and De Jonge 60). Despite this mistrust the Netherlands remains a ‘high trust society’ with a high opinion of science, but with less trust in scientists themselves and it’s institutions (Tiemeijer and De Jonge 35).

### **The role of the competition**

The question is what role does the award want to play in this tricky relationship between science and the public? There have been a lot of new developments that had a huge impact on society, therefore the competition sees it as its task to enhance public engagement. The competition itself describes the goal as: “stimulating the societal debate about the use and necessity of the life sciences for health, nutrition and sustainability”, so the term public engagement for the Bio Art & Design Award must mean stimulating a dialogue with society. According to the MU Press Release the winning artworks of the Bio Art & Design Award are about a feeling of urgency. Each project should bring up questions about who we actually are as people, what our role is and where all these developments in the biosciences are leading us (Debatty). Artists should do this by experimenting and manipulating as much as they can to create fascinating results (“Matter of Life Press Release”). According to Jury chairman William Myers, a competition like the Bio Art & Design Award is a useful platform for staging interactions between specialists and non-specialists in the sciences. He does add, however, that it is not the end goal, but more like a nice to have feature, saying that ultimately a competition like this is about supporting a high quality project (“Interview”). What he considers to be a high quality project is something we will find out later when looking into the winning artworks. To sum up, the artworks have to stimulate interest and debate through high-quality, original artistic practice.

This goal is, however, questioned in the article *Derde oog op een kikkerkop, mag dat?* by Tamar Stelling, published in 2010. Here the winning art projects of the Bio Art & Design Award are being criticized for being just pretty, just decorative or just fun. Prof. Robert Zwijnenberg and Huub de Groot’s critical opinions were quoted in this article, saying that the artworks weren’t controversial and instead of closing the gap between science and the public, these ‘pretty’ artworks more likely disguised it. The fact

that they weren't controversial was because the judges didn't want to promote artworks that could frighten off the main public instead of engaging them. A lot of the winning artworks are just fun ideas according to Zwijnenberg, but fun art is quickly considered as decoration and in a society where all the traditional functions of art are already taken over by entertainment and advertisement, an artist should really think about what his role should be. De Groot understands the fear of the NGI for using controversial art, because the life-sciences have had a hard time in the past, but still he advises competitions like the Bio Art & Design award to start looking for bio-artists who really contribute to the life sciences debate (Stelling) It is because of projects like these that Zwijnenberg and De Groot see the Bio Art & Design award as just a caricature that conceals the main goal of science and art. According to Zwijnenberg the NGI uses bio-art as a marketing instrument for the life sciences.<sup>1</sup> These organisations want something in return for their collaboration; artworks that portray them in a positive light. This statement was reaffirmed when the director of the NGI Colje Laane mentioned that they deliberately choose artworks that weren't controversial, explaining: "We want to portray the life sciences in a positive light because the public is already scared enough". Not everyone from the NGI agreed with this statement, Wilma van Donselaar responded that the competition didn't have any restrictions at all, except from the fact that artists had to have finished their art education within the past five years. She argued that all the past winners were free of restrictions and had therefore led to great success. As an example she mentioned Jalila Essaïdi's *2,6g 329m/s* because it drew huge media attention in different parts of the world, and was even picked up by the American army (Stelling).

### **Winning artworks**

When it comes to defining the term bio-art, many external articles and publications use a specific definition when writing about the Bio Art & Design Award, but the competition itself keeps a neutral standpoint. Looking at the submissions and winning artworks almost every one of them consists living media in one way or another. However, there are also examples of selected artists that don't directly use living media for their presentation like the installation *The Faculty of Wisdom (2015)*. In this installation visitors are invited to view the visions and ideas of elderly people in an installation that functions as a poetic bio bank. Instead of containing scientific data this bio bank contains the wisdom of elderly people in the form of written notes ("Shortlist Bio-Art & Design Award"). According to jury chairman William Myers bio-art includes much more than living media. It can utilize living biology as a medium or address the changing nature of biology's meaning. This can happen in all sorts of ways ranging from an experiment in a petri dish to a photograph. What is defining is the work's connection with meaning in flux (Myers).

When comparing the winning artworks the questions that I will be considering are; if the winning artworks reflect the idea that the competition claims to strive for and how much each work contributes on the technological and scientific level, how much on the artistic/aesthetic level and how much on the

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<sup>1</sup> NGI stands for: the Netherlands Genomic Initiative

conceptual level. This will help analyze the artworks and discover if they reflect the critical stance this competition claims to have.

Starting with the work I described earlier by Jalila Essaïdi: *2,6g 329m/s*, also known as *Bulletproof skin*. This is a very interesting project that still to this day is often considered as the figurehead of the competition. (Image 2.1) Its aim was to “explore social, political, ethical and cultural issues related to safety in a world that offers constantly changing access to biotechnologies”. In her project Essaïdi wanted to show that safety is a relative concept through an examination of the concept ‘bulletproof’. This critical and artistic examination, as she called it, was on display for six months at the natural history museum Naturalis in Leiden (Zwart 75). It consisted of a stretched bulletproof skin, a video of ballistic tests on different types of skin and an incubator which contained growing tissue cultures of bulletproof skin, accompanied by a guiding text for visitors. When looking at the presentation, it was more a showcase of an experiment, lacking completely in creative expression and artistic contribution. It did, however, contribute on the scientific level. Illustrating the competitions statement, that close collaboration between artists and scientists does not only lead to new artistic explorations, but has an impact on science as well. The projects frequently lead to new scientific discoveries, as artists make scientists aware of yet unexplored possibilities. This is how *Bulletproof skin* led to new dermatologic research and potential applications. As a result the artwork was promoted in the media with impressive headlines like ‘Bulletproof humans’ and ‘Super skin repels bullets’ (Andriessen). (Image 2.2) In these articles the project isn’t described as an artwork but more as a ground breaking scientific discovery. ‘Kogelwerende huid’, an article by Nadine Boke, was among the top ten best-read stories of the Dutch science website [www.npowetenschap.nl](http://www.npowetenschap.nl) in 2011. In this article Boke inspires the readers with a vivid description of the new innovative combination of materials and the unique properties of spider silk, but just like in most publications on this artwork there is no mention of any reflective or critical standpoint. According to the jury rapport the reason the project won first prize was because it had the biggest potential to cause debate. The media, however, only focused on the greatness of this new invention of ‘super skin’. According to Hub Zwart, one of the jury members during the competition, this was exactly why the artwork was the perfect example of good bio-art. *Bulletproof Skin* presented the public with samples of the present and the future. The artwork didn’t represent nor did it criticize science, more likely it revealed important aspects and dimensions of the research practice (Zwart 48).

That the competition attaches much value to attention in the media became especially clear when Wilma van Donselaar pointed at the media hype around *Bulletproof Skin* and the interest of the American army as an indication of its huge success (Stelling). Essaïdi responded to this interest saying that the primary significance remained artistic and that her work posed important and challenging questions about the way we conduct our lives and the very meaning of safety. She saw her artwork as a mirror, showing us what was really going on and helping us to redefine ourselves (Zwart 21). You get the impression that Essaïdi’s concept was overshadowed by all this media attention. Yet Oron Catts, who himself is known for his provocative and critical bio-artworks, sees the fact that the artwork received so much media attention

from different areas as successful. Saying that Essaïdi's strategy of seeking scientific validity for her symbolic gesture of creating bulletproof skin is at the core of this paradox. Essaïdi had tried to bring across the meaning of her work but these attempts were muddled time and time again by the misinterpretation of usefulness. This is for Catts where her art succeeded: "As the global media celebrated the utility of this action, Essaïdi cleverly inserted her art by stealth" (Zwart 31). In the end Essaïdi's intention was directed at getting to the heart of the scientific establishment, to try and deliver an artistic action against the resistance of utility, exposing the art proof nature of our times. Along the way she might have helped engineers to develop new materials for biomedical application but for Catts this was much less important than confronting all who have been exposed to this work with the realization that something very strange is happening to life, something we all need to pay attention to.

To find out if the work really did confront the audience in the way Catts describes it, we can turn to Suzanne Sleenhoff's study on Essaïdi's work. During the exhibition Sleenhoff held a survey to discover how *Bulletproof skin* affected visitors and to what extent it triggered engagement.<sup>2</sup> The collected data shows that, before visiting the museum, most visitors had mixed feelings towards genomic research in the context of human enhancement (Zwart 75). *Bulletproof skin* triggered engagement amongst visitors with developments in genomic research in relation to safety. It aroused emotions and caused visitors to think about what the development of bulletproof skin would stand for. The artwork opened up visitor's perspectives, but apparently they didn't perceive it as reassuring, it often even raised uneasy feelings. A lot of visitors started questioning the desirability of the development of a bulletproof skin and they started asking themselves if science was going in the right direction (Zwart 77). This was the exact reaction Essaïdi had aimed for. On the one hand one could argue that *Bulletproof Skin* only contributed on the scientific level in that it was just a showcase of what science was capable of, on the other hand it did articulate different dilemmas that were triggered by a new scientific experiment. It triggered engagement amongst visitors by making these dilemmas visible and tangible, contributing on the conceptual level by articulating what the future could look like (Hanssen et al. 46). However I must add that based on what the competition's representatives have said and the descriptions in their own publications, the emphasis mostly lies on the scientific contribution, making it very questionable if the competition chose the artwork with the same goal in mind as Essaïdi herself.

A comparable project that shook up society a year later in 2011 is *System Synthetics* by Maurizio Montalti. (Image 2.3) This artwork aimed to realize a bioreactor in which a human made synthesis of fungi would thrive to biodegrade plastics into bio-ethanol. In doing so this collaboration between designer Maurizio Montalti and the Kluiver Centre aimed to inspire the public by promoting discussion about the benefits of a man-made evolution of life. Montalti wanted to make people aware of the heavy burden it put on ecology and ultimately on itself ("Interview"). In the jury rapport they were convinced of the idea

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<sup>2</sup> In order to assess the extent to which 2,6g 329 m/s engages visitors, Sleenhoff used three different methods. This allowed for data triangulation. The visitors were observed to assess how they reacted and interacted with the project. Next, a series of short pre- and post interviews, with almost a hundred visitors, were conducted to evaluate a possible change in the extent to which they were engaged. A series of four focus groups was organized to discuss more closely and in depth how visitors got engaged. Sleenhoff 2005, p. 75

of symbiosis and sustainability of *System Synthetics*, but were hesitant about the possibility to inspire the public and promote discussion. Not that they weren't convinced of the significance and meaning of the project, but it would be a challenge to see the public dissemination addressed in the realization. The execution was once again not very innovative with its traditional lab feel, but apparently it did do something with the public. PCST held pre- and post-interviews with almost 100 visitors to study how *System Synthetics* engaged its visitors with a bio-based economy. The outcome was very positive; on the behavioural aspect it triggered statements of personal responsibility amongst visitors (Sleenhoff 88). So just like *Bulletproof Skin* the artwork has a significant role to inspire the public and promote discussion about the benefits of a man-made evolution, but lacks in artistic expressiveness. This does raise the question if the whole artistic presentation was even necessary in this case. If the public had this engaging experience triggered by an installation that looks like a laboratory, wouldn't they have had the same experience standing in a real laboratory? It's interesting that these projects fail to create their own aesthetics appropriate to their concept but that they do succeed in engaging their visitors.

There are more examples of winning artworks that led to new scientific insights, like *Aqua Vita* by Susane Camera, Mike Thompson and the Netherlands Metabolics Center. (Image 2.4) It was a project that used urine to create chronobiological metabolic paintings, functioning as visualizations of personal metabolism in which health is linked to lifestyle and diet as they form a dynamic system. These 'piss paintings', as they are referred to, turned out to be very interesting multidimensional visualizations for the sciences (Essaïdi, "*Bio-art & Design Award*"). In the rapport the judges expressed their doubts about its artistic articulation but they were curious to see the outcomes of the metabolic paintings and their possible function as critical design objects. Looking at these final 'objects' the emphasis was more on scientific innovation than artistic presentation. This focus on utility and scientific contribution is also reflected in the jury's mentioned curiosity whether the metabolic paintings offer the potential to be prototyped as personalized health applications ("*Aqua Vita Jury Rapport*"). The project was also mentioned in three medical publications, none of them were critical or reflective ("*Articles*"). Another artwork that contributed only on a scientific level is *Concrete Lichen* by Lionel Billiet. (Image 2.5) This artwork was an investigation into the growing of lichen on concrete buildings as a new coating and decoration material. Researching the applicability of this organism would also benefit the public as it could serve as a sensor for air pollution. According to the DA4GA jury-rapport of 2011 *Concrete Lichen* has artistic, scientific and societal potential, as it may prove the beauty and usefulness of lichen to the public. In the end the project contributes mostly on the scientific level because it particularly aims to learn how to grow the lichen *Xanthoria parietina*, which is a scientific challenge because it has slow-growing characteristics.

A winning project that initially had more of a scientific focus but evolved during the process was *In Vena Verbum – Message in a Vein* created by Tiddo Bakker and the Centre for Bio systems Genomics. (Image 2.6) This artwork measured and visualized physiological activity of plants, using a L.E.D. induced chlorophyll fluorescence transient imager (Essaïdi, "*Bio-art & Design Award*"). By visualising this normally hidden activity they wanted to make people aware of the fact that plants are more than just

decorative objects. In the DA4GA jury rapport of 2011 they were very positive about the strong two-way enthusiasm in the proposal and they were curious how the plant's 'feelings' would be translated and how the eventual design would blend with the plant it interacts with. The jury mentioned in its report that they foresaw a possibility in the instrument being commercialized for home use, as a device that could measure the plant's health as an indicator of the indoor environment. This shows how they appreciated the artwork for its technical innovation and potential applicability. However, during the process, the focus shifted towards its artistic execution. It was presented as an impressive and beautiful rotating iron construction with the plant in the middle, driven by the measurements of plant activity. According to Bakker, the artwork constituted a symbiosis between technology and nature, giving people more insight in their environment ("In Vena Verbum"). There was a documentary following the designers and scientists of *In Vena Verbum* and *Aqua Vita* after winning the award. Here you really see how the emphasis lies on the collaboration and interaction between the artist and the scientist and how they explore the boundaries between science and design. In the case of *In Vena Verbum* the artist seemed to have the upper hand. I believe that this artwork didn't glorify the scientific innovation like the previous artworks, mainly because there was such a sustained artistic focus.

The competition also has winning artworks that emphasise mostly on the artistic level like *Microscopic Opera* (Image 2.7). Matthijs Munnik created this artwork in 2011 with the help of the Netherlands Consortium for Systems Biology. In this audio-visual installation Munnik used tiny, transparent mutated lab worms, the model organism in research laboratories, to produce sounds and images. It was a reference to the beauty but also the stupidity of humanity. It questioned our human relationship to the natural world by suggesting that we are not the only ones playing God and that maybe we are also manipulated without being aware of it. Talking about the relationship between art and science Munnik responded: "There is a lot of beauty in science; in chemistry, physics, biology, mathematics, it's just waiting for artists to take it and use it to create new art" ("Interview"). And that seems to be exactly what his artwork does; it shows us the beauty of science. A lot of attention has been paid to the aesthetic presentation. This was reaffirmed in the official publication where the jury stated that they were above all impressed by the playfulness and beauty of the project ("Jury Rapport Microscopic Opera").

In the fourth edition of the competition there was a project called *Fungi Mutarium*, that in many ways was reminiscent of the earlier winning artwork *System Synthetics*. (Image 2.8) This artwork by Julia Kaisinger and Katharina Unger responded to the urgent need to revolutionize food production by investigating plastic waste as a nutrient source to help grow edible biomass. The jury was probably convinced of the idea of sustainability in this project. The work is comparable to *System Synthetics* in the way that it tries to inspire the public and promote discussion about the benefits of a man-made evolution. However, in *Fungi Mutarium* much more attention is paid to an appropriate aesthetic presentation that reflects the project's engagement with the public and the sciences. It is presented as a futuristic farming system with specially designed cutlery items and recipes for serving the edible biomass. You could say



that it is the improved version of System Synthetics in that it doesn't only contribute on the scientific level but also on the aesthetic and conceptual level.

During the years there has been a slight transition towards more critical artworks. Especially when comparing the projects presented in 2015 with earlier winning admissions, this transition is noticeable. The awarded artworks have become more critical in that they complicate the typical acceptance of the life sciences and their application (Myers). These artworks warn us for future scenarios. Starting with *The MSA: Microbiome Security Agency* by Artist Emma Dorothy Conley and Scientist Guus Roeselers. (Image 2.9) This conceptual artwork investigates the future of microbiome privacy issues and prepares citizens for a future where our personal information is at risk through our unprotected biological datasets. The project wants individuals to be able to secure their own data through the use of a toolkit of DIY biological information manipulation tactics. This project examines an important and fast moving area of research and highlights how this research will create vulnerabilities to our privacy. The jury rapport stated that they were particularly impressed with the proposal's explicit critical stance and the thoughtfulness with which the scientist embraced this criticality. Especially considering that Roeselers' research is normally based on collecting, preserving and sharing micro biome data, which is the exact opposite of what Conley wants to do in her project. Roeselers wanted to serve the larger purpose of informing the audience about what's at stake in the field of human microbiome research. The jury was also positive about the way the project was inflicted with humour. They felt this was an appropriate way to balance the seriousness and criticality of the project ("Jury Rapport 2015"). Another conceptual but more serious winning artwork from that year was *The Art of Deception*, created by artist Isaac Monté and professor Toby Kiers. (Image 2.10) It reacts to our use of deception to achieve perfection in society, art and science. In this project Monté wanted to take discarded pig hearts and transform them into elegant vessels for new life by de-cellularizing them and re-populating them with various techniques, into new fully functional and aesthetically improved hearts for humans. He aims to explore how biological interventions and aesthetic manipulation can be used as tools for the ultimate deception: the transformation of inner beauty, from grotesque to perfect ("Jury Rapport 2015"). This project addresses notions of human enhancement, the deceptive nature of beauty, and the developing science around tissue culturing and organ donation. The jury was intrigued by the close involvement of prof. Toby Kiers and predicted valuable conflicts with the artist. Monté examines a future scenario in which scientific improvements of organs doesn't come forth out of medical necessity but out of greed and vanity. Like *Bulletproof Skin* it presents a scenario in which scientific tools are appropriated for questionable desires rather than medically identified need. There is, however, a difference in that the meaning of this work can't be muddled by the misinterpretation of usefulness, considering this scientific finding is by definition useless. The aesthetics of the work are appropriate to the content, exhibiting the uncanny, a simultaneous attraction of familiarity with repulsion ("Jury Rapport 2015"). This is a great example of an artwork that checks all the boxes the Bio Art & Design award claims to aim for. It is a high quality project in that it is

aesthetically interesting, it causes debate and it critically examines the social, cultural and ethical contexts of the life sciences.

So despite the fact that the Bio Art & Design Award is a relatively young organisation, it does have a distinguished development from when it started. The aim to stimulate young artists and designers to experiment with bio-art has stayed the same but the way the artworks engage with the public and the sciences has changed over the years. There are a couple of examples where the close collaborations between artists and scientists have led to new scientific discoveries. Especially in the beginning there were some artworks that simply glorified these scientific discoveries. This has become less over the years and the recent artworks that do fall under this category have usually developed a more sustained artistic focus. The competition claims that it selected these projects because they have big potential to cause debate and that it is not them but the media that focuses on the greatness of these new inventions. However, in interviews and publications the competition attaches much value to this media attention as an indication of its success, making their statement doubtful. In the past the award has already been criticized for not being controversial enough, and functioning as a marketing instrument for the life sciences. During the years the award has slowly come to see more applications and winning proposals that are critical of some aspect of the life sciences or its applied forms. Within the competition the jury members have different opinions on bio-art, some think bio-art should not be criticizing science, while others are of opinion that there should be many more bio-art examples that contest and complicate our typical acceptance of the life sciences. The most recent winning artworks of the competition seem to reflect this last opinion.

## 2.3 Wellcome Trust Arts Award

The Wellcome Trust is a leading independent research-funding charity whose mission is to foster and promote research with the aim of improving human and animal health. It is seen as a powerful and well-recognized brand that funds early-stage projects through smaller grants as well as production-based applications (Glinkowski and Bamford 11). The Wellcome Trust created the Arts Award in 1996 to break down the barriers between science and art and to stimulate cross-fertilization (“Wellcome Trust Arts Award”). This collaboration is described as benefitting both parties: for art it is the chance to gain inspiration from science’s insights into the natural world, for science it is an opportunity to gain an entirely new perspective on research (Wilson 48). Each year one can apply for funding at two levels: the Small Arts Awards (up to £30 000) and the Large Arts Awards (above £30 000). The goals of the award are described in five clear bullet points:

- stimulate interest, excitement and debate about biomedical science through high-quality, original artistic practice
- examine the social, cultural and ethical contexts of biomedical science through the arts
- encourage new ways of thinking
- promote high-quality interdisciplinary practice and collaborations between arts, science and education practice
- support formal and informal learning (“What are Arts Awards?”)

Interestingly these goals seem to be exactly the same as the ones described by the Bio Art & Design Award. One noticeable difference is that the Wellcome Trust is more focused on education. Another difference is that the Wellcome Trust Arts Award is not so much a competition as it is an open application grant-funding scheme. David Cahill Roots, Arts Manager at Wellcome Trust, admits the award looks a bit like a competition but makes clear that it certainly is not (“Interview”). This does make the award different from the other competitions but the concept and the functioning of the Arts Award is still rather similar and therefore relevant and useful for this research.

### UK’s relationship with science

When researching the origin of the Wellcome Trust funding programs, it all seems to point back to the famous lecture written in 1959 by English chemist and novelist C.P. Snow, called *The Two Cultures and the Scientific Revolution* (Levinson et al. 2). In this lecture Snow reflects on what potential achievements could be obtained if there was a greater interaction between the arts and sciences. Snow was preoccupied by what he perceived to be ignorance about science among the academic and political establishment. According to his vision, if Britain was to remain a successful industrial economy, the breach between the arts and science needed to be overcome and the value of the sciences to cultural and economic life needed

to be fully recognized. The cultural divide was not just an English phenomenon but it did seem at its sharpest in England (Snow 17). In the 1980's and the 1990's British scientists once again started paying attention to this cultural division and its economic consequences. Only now they placed great emphasis on the public as a key element in responding to these challenges. By the mid-1990's it appeared that the wisdom of Snow's thesis was truly being recognized in the UK and was leading to new ideas and practical proposals in the interdisciplinary field of science-art. It was during this time in 1996 that the Wellcome Trust launched the first of series funding programs for science-art projects. These funding programs focused on bridging the two cultures with artworks that could improve the public's relationship with science (Born and Barry 108). This was especially important during the moments of crisis in the relationship between science and society, like after the BSE debacle in 2000. During that year society's relationship with science was in a critical phase according to the *Select Committee on Science and Technology* rapport published by the *House of Lords*. On the one hand, the public was very interested in the exciting issues involving science, but on the other hand public confidence of scientific advice to the government had become questionable by a series of events. A lot of people felt deeply uneasy about all the opportunities presented by science, which seemed to be advancing too fast. In turn, this public unease, mistrust and occasional hostility were creating a climate of deep anxiety among scientists themselves (Hodson 11). It was then considered bio-art's job to assist in bringing the public's hopes a bit closer to the hopes and objectives of research institutions. This could be done by attracting the public to science through its aesthetics, or by bringing expressive experience into the domain of science (Millar). There is a common perception that the UK was in the vanguard of this new approach to public engagement (Einseidel 58).

Since that rapport in 2000, the British Government has held yearly surveys published as *The Public Attitudes to Science* (PAS), determining society's attitude towards science. When comparing these surveys it seems as if the trust-crisis recently has gotten better, society has gotten more at ease with science than a decade ago. Another relevant data source called *Trust in professions* shows that scientists as a professional group have also been gaining in trust. Especially in the past two years the percentage of respondents that generally trust scientists increased from 71% in 2012 to 83% in 2014 ("Trust in Science"). The House of Lords stated in 2000 that independent scientists and scientists working for environmental groups generally scored well on 'trust' and government and industrial scientists generally scored badly (Tiemeijer 16). This hasn't changed in the last 15 years according to the *Science and Trust Expert Group*, stating that there still appears to be a crisis of trust in industry and government sponsored science (Tiemeijer 63). This situation is comparable to the Netherlands but we will see that the Arts Award has a very different approach than the Bio Art & Design Award.

### **The Sciart Award**

In 1996 when the Trust started launching their first funding programs they started with the Sciart Award. This award aimed to fund collaborations between researchers and visual, media, and performance artists.

When the Sciart Award ended in 2006 the Wellcome Trust commissioned the Engine Room at the University of the Arts London to undertake an independent evaluation of the Award to help influence future strategies for the Wellcome Trust's new arts program. In this evaluation there is a widespread view that during the years of the Sciart Award the artists had helped to demystify contemporary science and made it more accessible to the public. The projects were often informative and educational, introducing new subject matters and ideas. The award had a positive impact on perceptions of both artists and scientists as communicators and as educators and the 'two cultures' were shown to have the potential to coexist in a beneficial relationship. It was suggested that Sciart artists had helped to improve a perceived image problem ascribed to scientists and science in general. A review of the artistic outcomes of the Sciart projects showed "a widespread dissemination to sizeable audiences, an unusual longevity of audience and professional interest, and positive media and critical review" (Glinkowski 11). The general view was that the flexible and non-prescriptive conditions associated with the Sciart Award were valued as having directly contributed to greater levels of risk-taking and thus innovation.

There was, however, a division of opinion over the Trust's willingness to back potentially controversial projects. Many interviewees thought the criteria for the Sciart scheme weren't flexible at all, and that they were explicitly linked to the promotion of the biomedical sciences. Other interviewees felt that this freedom to take risks had been there at one point but had declined in Sciart's later years (Glinkowski 8). They felt that the Wellcome Trust was looking for more fully worked-out proposals that had a real scientific content. The interviewees declared that some of the projects inevitably were more PR than anything else and that the Wellcome Trust had prompted artists to do projects that they wouldn't otherwise have done, and not in a positive way (Glinkowski 34). It worked both ways, in the evaluation interviews with the scientists the consensus view was that Sciart had helped to connect the cultures of art and science but that the weight of the scheme was skewed towards the arts and that it was the artists that derived most benefit from these collaborations. Scientists described the competition as a great learning process for the artists in which they were funded to spend time with 'real experts'. This description clearly shows that many scientists still saw themselves as superior within the collaboration.

After ten years, one hundred eighteen projects and nearly three million pounds of funding the program came to an end. Even though the competition had generated a strong brand name and enabled a lot of innovative and high quality projects, the mythology of Sciart had gotten disproportionately negative according to the Trust (Glinkowski 129). Sciart had become a label that was negatively associated with instrumentalisation of the arts and a ghettoization of arts practices that were concerned in some way with the sciences. They wanted to get rid of this label and decided to develop a new identity through the Arts Award (Glinkowski 59). By dropping all terminology around bio-art and sciart the competition wanted to distance itself from any bio-art sub-culture. Even though there still is an inevitable desire to put work in boxes, David Cahill Roots believes, this way the results of the Arts Award can exist as outstanding pieces in their own right ("Interview"). The Arts Award had also broadened its criteria to ensure that they encouraged a diverse range of innovative methods and new models of practice (Glinkowski 5). There are,

however, still boundaries, thus there is less interest in supporting the representation of science. David Cahill Roots explains in his interview that the imagery of contemporary medicine and biological research really only becomes interesting when they are part of an artist's critical engagement with a subject. As an example he gives *Investment* (2013) by Tabitha Moses. (Image 3.1) In this artwork Moses critically explores medical processes and personal beliefs surrounding IVF and infertility through a series of photographic portraits and hospital gowns. The gowns are hand-embroidered with a mix of imagery from modern medicine and symbols of ancient folklore. This artwork does distinguish itself from scientific representation in that it doesn't glorify science and the used imagery has a sustained artistic focus ("Stutterer").

### **Public Engagement**

If there is one organization that uses the term public engagement a lot, it is the Wellcome Trust foundation. They saw early on that if they wanted the public to trust, debate and value scientific progress, they needed a society engaged with contemporary science (Walport 3). Even though the vogue has recently been for public engagement that impacts policymaking, it seems as if the Wellcome Trust doesn't completely reject the deficit model. The reason for this, according to the Trust, is because the public is still very much interested in scientific discovery and they don't want to ignore the clear public appetite for science. Also individuals can benefit significantly from an awareness of emerging medical opportunities, of risk and safety, and of the role of the media in reporting medical science (Matterson 5). Therefore the projects tend often to be informative and educational, introducing new subject matters and ideas. According to David Cahill Roots in his interview the Wellcome Trust doesn't have one specific definition of public engagement. It is more about highlighting how science is relevant to people's lives and creating a space where they are able to question and challenge and perhaps influence future research. It's about finding a way for people to meet as equals. The Wellcome Trust's list of science-art projects does show a specific strategy to encourage people's engagement with science using collaborative works like films, installations, workshops, theatre productions and exhibitions. These collaborations come in many different forms. There are artists, fascinated by the conceptual implications of modern science, who react to the science through their artistic output. Then there are actual partnerships between artists and scientists where much emphasis is on how the relationship works and evolves, what insights occur along the way (Webster 79). An example of such a project is *Fluent Heart*, in which heart imaging specialist Philip Kilner, choreographer Wayne McGregor, and the composer Sir John Tavener worked together to create the dance piece *Amu*. In addition to his years at medical school, Kilner also had an arts training at Emerson College in Sussex and now working in a hospital Kilner claims that this immersion in the arts profoundly shaped the way he comes to understand the heart's swirling vortices and rhythms. But before we jump to conclusions, Stephan Webster, part of the Trust's Public Engagement Capital Awards Committee, adds that even though these projects are very interesting collaborations for both parties, we shouldn't try and force them into crude formulations that speak of 'art influencing science' because it is

much more subtle than that, it is more about opening up science (Webster 80). Finally, and most relevant to UK's idea of public engagement, there are the collaborations that bring science to a new and wider audience. Years ago the Sciart Award had been accused for the instrumentalization of art and when looking at the Wellcome Trust's educational and informative stance one could imagine that this could happen again. Roots does understand why sometimes bio-art is being criticized for purely functioning as a form of advertisement for the life sciences. "I suspect there's a point in the early history of many of these schemes where that was an intention. And I understand the assumption that one would draw about an organization with a remit to support biomedical science supporting the arts. It's not unreasonable to conclude it's about PR" ("Interview"). About science advertisement in the Wellcome Trust Arts Award he says that most of the artists they work with would run a mile if they felt they were offered funding to advertise science but that they are also free to engage, interrogate and create as they see fit. Very often as a result of the dialogue the artists have with their scientific collaborators, they choose to communicate something of that research as a way of opening up the dialogue with an audience. He describes that the important thing is to trust the integrity of the artists and scientists they work with, insinuating that once they decide to fund a project and the collaboration has started, it is more or less out of their hands ("Interview").

### **Winning artworks**

In the past decade or more the Wellcome Trust has invested more than £100 million in funding different projects, institutions and activities. I have made a selection from all the different artworks the Trust has funded to create a concerted body of work that can give a clear insight in the functioning of this award. Because the amount of funded artworks is so huge I decided to emphasize mostly on the highly funded projects because they reflect what artworks the competition sees worthy of a high investment. I'll be looking to see if the artworks truly reflect the idea that the Wellcome Trust claims to strive after and how much they contribute on the technological and scientific level, how much on the artistic/aesthetic level and how much on the conceptual level.

Starting with the artwork that is described as one of the Wellcome Trusts' highlights: *Invisible Breathe* (2010). (Image 3.2) This project by Alice Sharp was a cross-disciplinary programme that created three new public artworks focusing on breathing and the impact of air pollution on our health and environment. Artist Dryden Goodwin explored children's lung health through drawings and animation to produce a large public artwork, Faisal Abdu'Allah created video artwork at The View Tube in East London and he produced experimental performances, while author Michael Rosen created workshops to inspire young people to engage, create, learn and experiment with the project's themes and artists' work. This project shows different approaches of connecting with the public and making them aware by illustrating the problems of air pollution in London in a subtle and aesthetically pleasing way, contributing mostly on the artistic level ("Arts Awards Funded 2009-10"). Another highly funded project is *Under* by Martina Amati, a project funded with 177.000 pounds but of which there is almost no

documentation to be found. The artwork, exhibited in 2012, was a multi-screen video installation that brought to life the experience of free diving into an urban space. This visual immersion would transport the audience emotionally, giving a sense of sub aquatic life and pair this with creative representations of the psychological effects of free diving on the body (“Arts Awards Funded 2012-13”). A similar project is *Cinema 3* by Mark Boulos in 2010, an immersive art installation that simulates an out-of-body experience in the viewer. The work was presented in a specially designed exhibition environment, in which viewers watch live 3D video footage of themselves on a screen, as they appear to fly through the air (“Arts Awards Funded 2010-11”). These questionable projects had very impressive technical qualities but didn’t really contribute on other levels.

Most artworks in this competition reflect the UK’s idea of public engagement, in which the collaborations bring science to a new and wider audience. The artworks aren’t considered real science-advertisement though. An example that illustrates this is the smaller project *Trying and Trying and Trying* by Gethan Dick (£8,000). (Image 3.3) Dick worked with six University College London scientists to write six song poems, each based on the experience and research of a single scientist. She then searched for six bands from a variety of genres to record the pieces. The CD featured text and images from each scientist as a response to the song about their work. It was a new way to engage the public with themes and data from contemporary biochemical research but it feels different from science advertisement in that it isn’t used as a direct instrument to promote it. Art is used as an illustration of the developments in science.

A more complicated artwork is *Chameleon*, a collaboration of £130,760 between artist Tina Gonsalves, neuroscientists Chris Frith and Hugo Critchley and computer scientists from Media Lab, MIT. (Image 3.4) This interactive, audio-visual installation showed participants how communication of emotion works within social groups. The project used an innovative sensing technology, driven by emotional expression, to create an engaging experience in which participants became empathically connected and create a deeper understanding about innovations in biomedical science. It contributed on the scientific level, in that the work represents a new research method, exploring social-emotional skills in human-machine interaction and generating data relating to patterned emotional expressions. At the same time the project caused unease among the public by using the tools of biomedical science and affective computing, which can be considered both promising and scary at the same time. Therefore this project also contributed on the conceptual level, causing uncertainty and debate about how these sensor technologies may be used to infringe privacy of participants and ignite feelings of vulnerability (“Chameleon”).

Most artworks were however comparable to David Cahill Roots’ personal highlight of the award: Mark Storer’s *For The Best* (2009) (Cahill Roots). (Image 3.6) For this artwork Storer enabled kidney dialysis patients to develop images and poems that would be incorporated into an innovative performance at the Unicorn Theatre. The use of image, playfulness and creative learning in the performance resulted in a complex poetic experience representing a fictional family’s story about the effects of critical illness (Walsh 228). By portraying the concept of illness and death through moments of aesthetic beauty Storer



wanted to move beyond the safe separation from the unease with which the public perceives illness. This project is a classic example of a Wellcome Trust Arts Award project, encouraging public engagement with science using an interactive art form, creating insight and understanding through a project with a sustained artistic focus.

There is one project that was rejected by the Wellcome Trust that gives an interesting insight in the situation of the foundation. It wasn't part of the Arts Award but it was an entry for an exhibition by the Two10 gallery in London, which is fully funded and operated by the Wellcome Trust. The philosophy of this gallery is to "challenge received ideas" and "encourage critical dialogue about important cultural issues", a philosophy that seems very much in line with what the Arts Award claims to strive after. The project was by the *Tissue Culture and Art Project*, who received an invitation by the gallery for a commissioned work in 2002. With the philosophy of the gallery in mind the artists created *The Pig Wings project*, in which they grew three sets of wings made out of pigs bone marrow stem cells. (Image 3.5) The wings size was 4cm x 2cm x 0.5cm each and they were never intended to be implanted onto pigs. The original proposal they sent as a response to the commission was titled *Wings detached -- the good, the bad and the extinct* (Zurr 32). It wasn't surprising that their work was rejected, as it was an ironic piece that pointed out the hidden agenda of how artists are used in service of a scientific development. However, the rejection letter from the Two10 gallery gave an interesting insight in what was going on in the world of bio-art and its corporate funding. It was a revealing document presenting what the gallery perceived as the role of the artist. It stated that the advisory group rejected the proposal because they felt that the project presented "an unrealistic reflection of the public's opinion of the Genome". This seemed ironic because the role of the artist according to the gallery's philosophy was to create critical dialogue through its unique view of the world. Another point that was raised in the rejection letter was that the gallery felt their work would not fit well with the other exhibits, once again contradicting their own philosophy and giving the idea that the curator is only using the participating artists to mask his own agenda. Oron Catts and Ionat Zurr described the project as an example revealing the on-going politics played out in the Art and Science hype (Catts and Zurr 33).

To sum up, the Wellcome Trust Arts Award is a powerful well-recognized brand with a long history in public dissemination of science. During the first years of the award, when it was still the Sciart Award, the program was explicitly intended to bridge the two cultures by enlisting artists to foster the public's relationship with science. This was especially important during the critical phases of society's relationship with science that England went through. Snow's lecture, in which the connections between the two cultures are promoted and accentuated, has continued to be an important point of reference in discussions about the relationship between the arts and the sciences. When setting up the Arts Award the Wellcome Trust wanted to get rid of the negative label sciart had created and develop a new identity. They dropped the terminology around bio-art or sciart and broadened their criteria to ensure that they encouraged a range of innovative methods and practices. The Arts Award created a specific strategy to encourage the public's engagement with science using interactive artistic works like films, installations

etc. Even though the vogue in the competition has recently been for public engagement that impacts policymaking, it seems as if the Wellcome Trust doesn't completely reject the 'deficit model'. The projects often tend to remain informative and educational, introducing new scientific and technological subject matters and ideas. There are examples of projects that could even be considered advertisement of the sciences but in these cases I believe the Wellcome Trust more likely uses art as an illustration of the life sciences than as an instrument to directly promote it. This probably has to do with the competition's long history that makes it a more natural collaboration. The artworks are mainly about creating insight and understanding but there remains an inherent conservatism in where the scheme is coming from that sets limits to critical experiments in art.

## 2.4. The VIDA Art and Artificial Life International Awards

The VIDA Art and Artificial Life International Awards was launched in 1999 by artists Rafael Lozano-Hemmer, Susie Ramsay and the Fundación Telefónica foundation, a non-profit organization founded in Madrid by one of the world's largest telecommunication providers. Fundación Telefónica has presence in Argentina, Peru, Brazil, Mexico, Colombia, Chile, Venezuela and Spain where it runs a large variety of programs focused on education and the application of information technologies. The VIDA award was created around the same time as the Wellcome Trust Sciart Award during the cultural shift within the arts towards a more interdisciplinary practice in which creativity was used to bring art and science together. Even though the directors of Fundación Telefónica didn't believe in the concept of a cultural competition, because art was supposed to be subjective, they saw it as their best option. The idea of a contest was considered the best way to transfer money to independent artists that really needed the support. Therefore the main aim of the VIDA Art and Artificial Life International Awards has been to "recognize artists who are interested in the current discourse on life through the latest technologies and the most recent scientific advances" ("Call for Entries VIDA 16.0").

What sets this award apart from the other competitions is that it is specifically dedicated to the study of life. Most of the artworks are listed as artificial-life (A-life) artworks, an art form that examines systems related to life through the use of robotics, computer models and biochemistry. It is interesting to see that the concept of life has changed a lot in the course of history, as it is increasingly understood as something that is not merely given by nature but as something that can be made and modified by what is referred to as the life sciences (Waelder, "Broeckmann"). It is the main goal of the award to propose a reflection or debate on these changing relationships between the living and the non-living (Reichle 167). Even though artificial life is usually categorized as a subgenre of bio-art, the competition itself does not seem to use this term to describe their works. In the interview with Monica Bello, curator and artistic director of VIDA, she explains why, saying that she and many other artists don't feel comfortable with categories such as bio-art because they would only serve to the purposes of certain art sectors that are beyond the creative process of multidisciplinary research.

The competition itself is subdivided in different prizes. The prize that I will be focusing on is the one that has been around the longest: the finished project prize. According to its description this prize goes to recently produced artworks that stand out for their high-quality technical resolution of their concept that should formulate unusual reflections on life, the complexity of living systems and the methods adopted to interpret this concept in the current context ("Call for Entries VIDA"). The projects given awards in this section will be distinguished by their communicative dimension and their ability to start up a dialogue with the public and their environment.

## **Trust in science in Spain and Latin America.**

Fundación Telefónica has been building up different programs to create opportunities for engagement and experimental arenas in regions where strongly emerging voices need to be heard (Waelder, “Sally-Jane Norman”). This is mainly in Latin-American countries and also in Spain. When it comes to science in these countries, it is clear that Spain and Latin America generally have a different position than other European countries and North America. When looking at the relationship between Spanish society and science it is rather paradoxical. Overall, Spaniards’ scientific knowledge is low when compared to citizens of other European countries (“Eurobarometer 2013”). At the same time, however, Spanish researchers are considered to be among the most prestigious professionals in the country. In a way they are being worshipped in Spanish culture (Juan Toharia). Even though the knowledge percentage is low, there is a very high interest in science. With 83% in 2013, Spain has the highest European percentage in respondents that think their government is doing too little to stimulate young people’s interest in science. This is 18% more than in 2010 (“Eurobarometer 2013”). In political parties there is also a shift noticeable in which it is becoming more and more important to bring research closer to the general public (Balbás Martínez). They are starting to realize the importance of bridging the gap between Spanish science and society.

When looking at Latin America scientific research is growing fast and becoming more visible on a global scale (Huggett). It is, however, not comparable to most European and North American countries. Brazil, for example, is the only country that spends more than 1% of its gross domestic product on research and development, and even this amount is much lower than what other countries of similar means are investing in science (Van Noorden 203). Latin American reporter groups have expressed an apparently increasing interest in science (Pinholster and O’Malley 2). At the same time bioethics as a field is growing quickly with an increasing number of conferences on bioethical issues and courses, degrees and Master’s Programs. They are still, however, many challenges when it comes to bioethics in Latin American countries. The link between the Church and bioethics is so tight in these countries that serious public discussion of controversial bioethical issues is often hindered. As a result, public discussion of bioethics in the region can rarely tackle all the ethical issues involved (Luna 9). When looking at art based on science in these countries it often isn’t very challenging. In Brazil for example, most of the funding of the arts comes from its corporates and is used out of its communications budget, which is why it usually communicates a positive message for the sciences (“Artists to the lab”). Considering the relationships Spain and Latin America have with science you generally would expect a more conservative and educational approach. Interestingly, as will become clear in the following chapters, the VIDA award seeks to focus mainly on crossing boundaries and causing debate.

## Winning artworks

It is because of this rebellious approach that the VIDA award has always been portrayed as a visionary and adventurous contest. It is considered the contest that has served as a launch pad for renowned artists like Eduardo Kac. The question is what exactly does the competition and the jury expect from these artists and their work?

The projects are selected based on their communicative dimension and their ability to start up a dialogue with the public. So the term public engagement in this competition refers to genuine dialogue between scientists and the public about meanings and consequences of scientific and technologic actions for society. The importance of these communicative dimensions become even more clear in Monica Bello's description of how the jury comes to choose the artworks. It is not a selection jury that makes the judgment but a mix of curators, artists, scientists, writers, editors, astronomers etcetera, that meets for 3,5 days and mentors and generates thoughts on what artificial life is nowadays. This way the works are the ones that have to create discussion and when they do, they will be chosen. It's what the artwork really evokes that counts ("Call for Entries VIDA 16.0"). The goal of these artworks is to help us envision new ways of understanding the world, Monica Bello does add, however, that we shouldn't see it as a medium that can truly change our way of thinking. It cannot be used as a tool to improve our conditions or our commitment with the world. Bello considers this idea as a New Puritan trend.<sup>3</sup>

Since the competitions' existence 1,500 artists from 37 countries have already participated. When looking at the artworks through the years, there is an interesting shift noticeable. Especially in the very beginning the competition was mostly linked to robotics, computation and chaotic algorithms but over time it has evolved with the addition of other concepts like the impact of biotechnology, environmental issues and the dynamics of information networks ("VIDA 15<sup>th</sup> Anniversary Celebration").

A classic example of the first phase is the first artwork ever winning the VIDA award called *Tickle* (1999) by the Dutch artists Erwin Driessens and Maria Verstappen. (Image 4.1) It is a small autonomous robot that can steer itself over the human body to generate a tickling sensation. *Tickle* is a smart design gadget but has qualities of a Readymade in the way it connects art to the social conditions of living. These qualities appear in its bridging to the commodity fetishism that surrounds us (Ten Haaff 7). It alerts to the impact of the industrial objects that aren't just add-ons anymore, but substitutes for life processes. They challenge our pre-existing notions of what is 'human', 'natural' and 'alive'. Another project that combines all these conceptual aspects is *Dog [Lab] 01* by France Cadet, first prizewinner in 2003. (Image 4.2) In this experiment Cadett created a monstrous hybrid, merging children's toys, hacked electronics, and social and political concerns into robotically enacted dramas. She created seven little chimerical robots that were shaped as a dog but had certain added characteristics. These characteristics were based on different transgenic animal species referring to different events in the history of science and bioethics. Like the cowdog prone to robotic BSE, twitching and collapsing on the floor, or a glowing

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<sup>3</sup> The term New Puritan refers to the increasing tendency for the young middle classes to accept increasing regulation and self regulation of their life curtailing the "consumption culture".

GFP Puppy referring to ALBA the famous rabbit. This artwork is an ironic and entertaining warning of the possible dangers and excesses of cloning, eugenics and other animal experiments. Cadett has found an interesting way to address these weighty issues of science and society while keeping it light. There are many more robotic artworks like this in the VIDA archive. A-Life robotic artworks and research robots investigate many of the same questions about agency and artificial embodiment but they are different in that A-life artworks aren't used to gain quantifiable information, they call attention to the changing relationships between robots and humans, whether those humans are the creators of an artwork or members of the public.

All though it was mostly in the later years of the competition that the jury started to focus on biotechnology, there are also early examples of biotechnological artworks like *Genesis*, a conceptual artwork by Eduardo Kac that won in 2000 during VIDA 3.0. (Image 4.3) It was Kac's first transgenic artwork. Here Kac plays with the mutability of language and the mutability of life forms (Lynch). This artwork involved him taking a verse from the Bible, transferring it into Morse code and translating that Morse code into the base pairs of genetics.<sup>4</sup> The verse was then encoded into the DNA of bacteria, which he grew in a petri dish. The petri dish was placed in a box under a webcam and an ultraviolet light that could be activated by online viewers. Activating the light would cause mutation in the bacteria, thereby altering the statement. Kac intended to present the viewer with a philosophical dilemma: if the viewer disagrees with allowing man to have dominion over nature as the quote from the Bible suggests, then in order to destroy the idea (activating the UV light) he must assert his own power over nature, thereby in a way contradicting himself. In the presentation of the artwork Kac visualized the work by creating fluorescent bacteria so once the bacterial communication took place one would start to see colour changes. Visualizing the process, however, did not automatically make it aesthetically interesting. It is clear that the purpose of this piece was much more symbolic than it was scientifically or aesthetically interesting.

Despite the early examples of biotechnological A-life artworks, the actual turning point came around 2005 according to Nell Tenhaaf. Gradually the jury and artist's perspective became more open to biotechnology by looking at hybrid projects. The media used by artists was evolving over time and this adaptation was necessary for the competition to accommodate itself to the current environment and ensure its survival. But it was thanks to the incorporation of Mónica Bello as artistic director in 2010 that the award started to become interested in the work that was being done in Europe and areas of research such as synthetic biology. The competition kept on evolving and led to many great artworks questioning the impact of biotechnology, environmental issues etc. ("VIDA 15<sup>th</sup> Anniversary Celebration"). A good example of how the contest opened to new areas was NoArk by Oron Catts and Ionat Zurr, second prize winner of VIDA 10.0. (Image 4.4) This work is a research project exploring the taxonomical crisis that is

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<sup>4</sup> Genesis 1:26 - "And God said, Let us make man in our image, after our likeness: and let them have dominion over the fish of the sea, and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepeth upon the earth") The sentence reads: "Let man have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moves upon the earth." It was chosen for what it implies about the dubious notion of divinely sanctioned humanity's supremacy over nature.

presented by life forms, created through biotechnology. It is a collection of cells and tissue from many different organisms, growing together inside a 'vessel', referencing to Noah's Ark. The project's website states that *NoArk* was "a tangible as well as symbolic 'craft' for observing and understanding a biology that combines the familiar with the other" ("NoArk 2007"). The jury hoped that *NoArk* would be a symbolic precursor to a new way of approaching the made nature, like the cabinets of curiosity that preceded the natural history museum's refined taxonomy. They visualized this idea beautifully in their presentation by placing the artwork in cabinets with colored glass, creating a modern science-fiction version of the curio cabinets from the Renaissance period.

The real turning point was in 2011 during VIDA 14.0 according to jury member Jens Hauser, with the first prize of that year *Pigeon d'Or* (2011) by Tuur van Balen. (Image 4.5) This artwork had a symbolic value according to Hauser, being indicative of the awards' future evolution. The project was developed with the goal of equipping common pigeons with new features to turn them into cleaning machines. Van Balen used the logic of bio-bricks to create something completely absurd: to manipulate bacteria, which in the pigeons' digestive system will transform their excrements into soap. This is in line with the current trends of altering living beings, rather than simulating life in digital environments (Waelder, "International Seminar"). It could be seen as a scientific discovery if the product hadn't been so absurd. This humorous and absurd artwork should make people stop and think about how synthetic biology might change ecology in many ways.

According to Hauser, emotions work as a bait to stimulate the spectator's interest and will to go into the background of an artwork and to push the spectator into scrutinizing the artworks cognitively. This is what bio-art does and should be doing, therefore good artworks are often either humorous or disturbing (Silvestrin). That the VIDA award doesn't shy away from artworks that can be experienced as disturbing or humorous becomes obvious when looking at the winning artworks from the later editions. A good example is the *Que le cheval vive en moi* installation by Marion Laval-Jeantet, winner of the third prize in 2011. (Image 4.6) This project made a big impression in the media where it was described as being extremely provocative. The artist had turned herself into a guinea pig when she was safely injected with horse plasma during a dramatic one-hour performance. The project questioned the anthropocentric attitude inherent to our technological understanding (Kerbe and Schmidt 130). In *Que le cheval vive en moi* it is the actual process that represents the artwork. Jens Hauser considers this as a phenomenon of our time: after the linguistic turn, the pictorial turn, and the performative turn, we have arrived now at an epistemic or epistemological turn, which basically deals with and analyzes the manner in which knowledge and objects are being presented. So the artworks in this competition are not about presenting knowledge, but about questioning and showing how knowledge is being produced, through an aesthetic object (Silvestrin).

In that same year *Que le cheval vive en moi* and *Pigeon d'Or* were both presented in the *synthetic* exhibition in Vienna where they were identified as the most ethically irritating artworks in the exhibition. The public's response to the exhibition was analyzed by Wolfgang Kerbe and Markus Schmidt

and in this analysis it showed that the integration of higher animals in artworks has a bigger impact on the public and poses more ethical questions (“Splicing Boundries” 132). While the use of higher organisms alone will not guarantee success and recognition in the art world, it seems to elicit an additional level of complexity and depth that can help the artwork stand out and create true discussion (Kerbe 134).

Looking at the artworks and reading the interviews with different jury members over the years you get the impression that, of all the factors in a submitted project, its contribution to scientific research is the least important. According to professor Sally-Jane Norman, co-founder and regular jury member for the Vida award, the balance is extremely varied. Even though some works awarded over the years have come from more scientifically oriented players in the field, the jury has always remained neutral. The focus was always on what the work had to say. Norman stated that an artwork should not be an explanatory device for science (Waelder, “Sally-Jane Norman”). There are also some jury members like Roger Malina that seem to think art is there to lead to new science, saying that collaborations between artists and scientists often result in new scientific discoveries. Most jury members, however, like Rafael Lozano-Hemmer, believe that art and science are two discrete entities. Hemmer strongly disagrees with those who say that we are undergoing a new Renaissance period, with new Leonardo’s who move easily between science and art. Science tries to simplify and predict behaviours while art seeks and creates ambivalence and uncertainty. Art doesn’t look for answers, but rather for questions. Not that art and science are totally at odds with one another, but art looks for concepts like interruption and absurdity that have no place in the sciences (“The Genesis of VIDA”). Art focusing on artificial life seeks to cross boundaries and establish productive interference between art, science and society (Waelder, “International Seminar”). When looking at the incentives described on the VIDA website with descriptions like: “They look for artistic projects that offer innovative perspectives on life by using the latest technology and cutting-edge scientific knowledge” you get the idea that science is used more as a tool to work out their artistic and conceptual ideas (“VIDA 15.0 Incentives for Production”). In the interview with Monica Bello, however, she describes the VIDA award as “a type of art that engages to advance knowledge and technical innovations”. When looking at the winning artworks it is clear that the competition doesn’t shy away from critical artworks. There are however also examples in which scientific innovations come to the fore. Like *Protei* by Cesar Harada and in Marguerite Humeau’s *Back, here, below, formidable*. (Image 4.7 & 4.8) This first project focused on creating “an open source sailing drone” to clean up ocean oil spills. *Back, here, below, formidable* was an interdisciplinary project, set up with a diverse range of specialists to reconstruct the vocal sound of an extinct wool mammoth by deploying fossil, Xray and CT scan data and interpolations from elephant anatomy to create a digital model of the vocal cavity. The presentation of the artwork consisted of a book documenting the research and process of the project, and two complete 3D reconstructed models of the windpipe. These artworks are the outcome of scientific research and technological innovation without any further critical message or aesthetic quality.

At the same time there are also prize-winning works that do not embody any strong scientific reasoning or processes within their fabrication. They develop productive reflection on such reasoning and



processes at a metaphorical level. Monica Bello describes that as long as the jury has the idea that these works have been executed effectively in artistic terms, they don't have problems awarding them (Tenhaaf 7). One of the artworks in which aesthetics play the decisive role is *Ornamental Bug Garden* by Vicky Isley and Paul Smith, which received an honorary mention in 2011. (Image 4.9) It was a synthetic, aesthetic ecological system, framed on the wall as a living kinetic painting. The artwork combined moving elements from video games, pachinko machines, and ornamental gardens. It was a fascinating and beautiful artwork but it didn't show any ethical dimension. The jury got enthusiastic about the mixture of apparently organic elements with unapologetically mechanical bugs. They commented on the work saying that occasionally they found a project that was simply beautiful, comparing it to a dinner date who is beautiful but a little dumb, which is okay because they're still fascinating ("Soon I'll be in the Dizzy Realms"). With these comments the jury clearly insinuates that this work was an exception and that they normally search for projects that show the more complicated and ethical dimensions around life sciences. In a way, this project reminded me of the Bio Art & Design artwork *Microscopic Opera*, in its focus on beauty and lack of ethical dimension. However, *Microscopic Opera* was one of the big prizewinners in the Bio Art & Design Award, where *Ornamental Bug Garden* received an honorary mention, showing that it didn't completely satisfy the VIDA requirements. This does illustrate the difference I believe there is, or at least there was, between these competitions, showing that the Bio Art & Design Award has awarded artworks that can be considered just 'pretty' or 'just fun' while the VIDA award generally awarded artworks that have more of an ethical dimension.

To sum up, VIDA has made an interesting shift through the years towards more critical subjects like the impact of biotechnology, environmental issues etc. The turning point came around 2010 when the award started to become interested in the work that was being done in Europe and areas of research such as synthetic biology. From that point on the competition didn't shy away from critical artworks that could be experienced as disturbing or humorous and became known as a visionary and adventurous contest. The competition believes that art and science are two discrete entities. When looking at the contributions on scientific, aesthetic and conceptual level the balance is varied, and even though the competition has also led to technological and scientific advances, its contribution to scientific research seems never to be the decisive factor. They look for artistic projects that offer innovative perspectives on life by using the latest technology and cutting-edge scientific knowledge. Despite some exceptions they clearly search for projects that show the more complicated and ethical dimensions around life sciences. Believing these artworks can help us to envision new ways of understanding. However, the award doesn't have the prophetic vision that these artworks can truly change our way of thinking.

## **2.5 FASEB BioArt Competition**

The FASEB BioArt competition can be seen as the outsider in this research because it was created with a very different goal than the other competitions. It is however the first link that pops up when searching for 'bio-art competitions' in Google and even though we all know Google is not a direct indicator of acknowledgement or truthfulness, it is interesting that this competition comes to the fore and is promoted as an important bio-art competition. The BioArt award was first organized in 2012 by the Federation of American Societies for Experimental Biology (FASEB), the nation's largest coalition of biomedical researchers representing over 116,000 researchers from around the world. The primary focus of this organisation is to "advocate and support the advancement of biological and biomedical sciences through educational meetings and publications" ("FASEB's Mission"). In the BioArt award they achieve this goal by celebrating 'artworks' that show what great achievements the 21st century sciences have made. The judging guidelines of the award are pretty simple: the laboratory-based images must be "original photographs, illustrations, or videos submitted by current or former US federally-funded investigators, contractors, or members of FASEB constituent societies". According to the jury, which not surprisingly, consists of a panel of distinguished scientists and engineers, the submissions should have an aesthetic impact and clearly communicate a cutting edge bio-scientific concept.

The idea behind the creation of the competition was that there were so many intriguing and captivating images and videos being produced during biomedical research, but that nobody ever saw them outside of the laboratory ("Bio-art Contest Winner"). FASEB saw these images as an underutilized resource that could be effectively used to engage and educate the general public and policy makers about biomedical and biological research. Their idea of engaging and educating is, however, very different from the other competitions. It is not conceptual, nor does it have a political emphasis, it is purely about celebrating the optimism of progress. This is a big contrast to the ideas of artists and curators like Ionatt Zurr and Oron Catts, who think bio-art, if it is anything, is not about representing the artistic side of scientists or the artistic side of the sciences in general (Zurr 22).

### **The American attitude towards science.**

North America is an interesting country when it comes to science. There is probably no other country where there has been so much debate about the truth of scientific discoveries. Creating public concern about scientific discoveries has become a true industry here (Oreskes and Conway 22). These concerns have been measured by the US National Science Foundation in their annual science indicators. The results from these surveys show that despite not being well informed about science and technology topics, American confidence in science and the scientific community has remained high. America has remained optimistic about the benefits of science compared to other countries. However, they also express strong reservations and concerns about scientific research not paying enough attention to moral values ("Science and Engineering indicators 2014"). The differences between Europe and the US are found in the different

socio-political environment that the countries are embedded in. In the US the focus lies strongly on bioterror and biosecurity since the 9/11 incident, whereas Europe the focuses more on bio-safety as a direct result of the GM-food debate. This is the reason that bio-artists in the US have had to deal with critical biosecurity issues and are monitored under the control of the FBI, while the European groups have received only little attention by the European and national law enforcement agencies. That biotechnology can inspire extreme emotional reactions was experienced by Steve Kurtz, founding member of the Critical Art Ensemble, who in 2004 was detained and investigated when he became the subject of a bioterrorism investigation because of the contents of his home lab. The case lasted four years but eventually Kurtz was not found guilty. His detention, however, put a hold on the development of bio-art in the US because it became harder to do research and there was a real fear that what happened to Kurtz would happen to others. As a result, bio-art has been more widely funded and displayed in Europe and Australia than in the US (Miranda). In recent years this division is fading away but still the collaboration between biologists and artists is less strong in the US compared to Europe (Seyfried et al. 549).

Suzanne Anker, head of SVA Bio Art Lab in Manhattan, described as the undisputed ‘doyenne’ of American bio-art, emphasizes that even though bio-art has grown tremendously, it is still relatively small and not widely known outside the big artistic places like New York (Anker). When it comes to the current state of bio-art, Anker, gives a mixed evaluation. Interestingly the artworks she mentions in this evaluation are both winning artworks we’ve seen in the other competitions in this research. The artwork that really piqued her interest is *Bulletproof Skin*, winner of the Bio Art & Design Award. However, there are also many artworks of which Anker is critical of their aims like the VIDA Award winner *Que le cheval vive en moi*. About this last artwork she said: “these things just turn bio-art into a freak show” (Patel 8). Anker also critiqued Eduardo Kac’s *Alba*, claiming that at the time his only goal was to create a glow-in-the-dark bunny and that the essay explaining his artistic vision was just made up afterwards. This read as disingenuous according to Anker and Kac came across as being more interested in spectacle than art (Patel 11). When looking at Anker’s Bio Art Lab it is clearly a less radical laboratory, using only lower order organisms and no human subjects or bodily mutilations. Bio-art, according to her, is not media-based, but more of a conceptual movement. She stated that there is a bright future for bio-art if artists behave themselves and start following the rules (Patel 12). Even though there are many American curators and bio-artists like Eduardo Kac and Adam Zaretsky that think bio-art should demonstrate the fragility of the objective authority of science and reflect ethically on the boundaries of science and art, most bio-art initiatives in the US are more about pushing artists to reconnect with science, and pushing scientists to utilize this revitalized connection for the greater good of scientific outreach (Parker 17).

### **Winning artworks**

It doesn’t even really feel necessary to look at the different winning artworks of the FASEB BioArt competition because they are all pretty much the same; they are all visualisations of scientific discoveries. But just to have an idea, the micrograph by Frank Moutos and Farshid Guilak is a good example. (Image

5.1) This work is used as the general showpiece of the FASEB art competition and it shows a three-dimensionally woven biomaterial scaffold used for tissue engineering to generate replacement cartilage. It simply zooms in on what we already know; science has created some amazing possibilities and techniques (Collins). Other examples of artworks are based on subjects like electron microscopy, fluorescent microscopy, digital data representations, etc. These 'bio-art works' do not contribute on the conceptual level, they are completely focused on contributing on the scientific level through the use of aesthetically pleasing images. It is simply a form of science propaganda celebrating the optimism of progress.

To sum up, the primary focus of the FASEB competition, organized by the nation's largest coalition of biomedical researchers, is to engage and educate the general public and policy makers about biomedical and biological research. Public engagement in this competition means advocating the advancement of biological and biomedical sciences to the public. They achieve this goal by celebrating 'artworks' that have an aesthetic impact and show what great achievements the 21st century sciences have made. Relying on the deficit model. Their idea of engaging and educating is very different from the other competitions. It is not conceptual, nor political, it is purely about celebrating the optimism of progress. In recent years this division is fading away but still the collaboration between biologists and artists is less strong in the US compared to Europe (Seyfried et al. 549). Even though there are many American curators and bio-artists that think bio-art should reflect ethically on the boundaries of science and art, for many American initiatives it is about pushing artists to reconnect with science, and pushing scientists to utilize this revitalized connection for the greater good of scientific outreach (Parker 17). The FASEB BioArt competition is the classic example of this American attitude towards science.

## Conclusion

By researching these four bio-art competitions I wanted to create insight in what is happening in the world of 'popular' bio-art and its development. I wanted to find out how art-science linkage works within these competitions and if they stimulate bio-art as being a form of critical art or a form of science-advertisement. During this research it became clear that these competitions are interesting cultural phenomena which all play a different role in the world of bio-art. While examining and comparing the goals and outcomes of these competitions there were many interesting observations that arose.

Starting with the Wellcome Trust Arts Award, the most powerful, well-recognized brand of all four competitions. The reason this competition could become so powerful was because of the UK's long history with public dissemination of science, all pointing back to the influence of C.P. Snow. There is a common perception that the UK was in the vanguard of the science-art approach to public engagement in which the public was attracted to science through its aesthetics. The Arts Award still uses this specific strategy to encourage the public's engagement with science using many interactive works like films, installations etc. Even though the Award developed a new identity after 'Sciart' had become a label that was negatively associated with the instrumentalisation of the arts, not a lot has changed. Looking at the winning artworks it becomes clear that the Trust doesn't completely reject the 'deficit model'; the projects often tend to remain informative and educational in their execution. However, the award doesn't feel like direct science promotion or advertisement. This is because the collaboration feels more natural and self-evident due to the competitions' long history in science-art collaboration. The Trust more likely uses art as an illustration of the life sciences than as an instrument to directly promote or criticize it.

This is very different from younger competitions like the Bio Art & Design Award. Very early on this competition has been criticized for not being controversial enough and for functioning as a marketing instrument for the life sciences. According to its description the award looks for bio-artworks that examine the social, cultural and ethical contexts of the life sciences that cause debate and that are aesthetically interesting. However, within the competition the jury members have different opinions on what bio-art is supposed to do: some think bio-art should contest and complicate our typical acceptance of the life sciences, while others think bio-art should not be criticizing science at all. This dissension reflects in a number of questionable winning artworks within the competition that can be considered to function as science advertisement. During the years, however, the award has come to see more and more applications and winning proposals that are critical of some aspect of the life sciences or its applied forms. It is hard to determine if this is due to the alternating jury members, or if it is a general shift in the world of 'popular' bio-art.

Looking at the VIDA Award you suspect the latter. VIDA has also seen a shift towards a more complicated view on science once it started focusing more on other concepts like the impact of biotechnology, environmental issues etc. The turning point came around 2011 when the award started to become interested in the work that was being done in Europe and areas of research such as synthetic biology. From that point on the competition didn't shy away from critical artworks that could be

experienced as disturbing or humorous and became known as a visionary and adventurous contest. The VIDA award believes that art and science are two discrete entities. When looking at its contributions on scientific, aesthetic and conceptual level the balance is varied and even though the competition has led to many technological and scientific discoveries its contribution to scientific research seems almost never to be the decisive factor. The objective in the beginning of the competition was to transfer money to independent artists who were interested in the current discourse on life and who really needed the support. Since then VIDA has always searched for artistic projects that offer innovative perspectives on life by using the latest technology and cutting-edge scientific knowledge. There are exceptions but VIDA generally searches for projects that show the more complicated and ethical dimensions around the life sciences, helping us to envision new ways of understanding.

The FASEB competition is the outsider in this research. This American competition focuses completely on engaging and educating the general public and policy makers about biomedical and biological research. Public engagement in this competition means advocating the advancement of biomedical sciences to the public. This goal is achieved by celebrating artworks that have an aesthetic impact and highlight what great achievements the 21st century sciences have made. Relying on the deficit model, their idea of engaging and educating is very different from the other competitions. It is not conceptual, nor does it have a political emphasis, it is purely about celebrating the optimism of progress. This has to do with the socio-political environment that the US is embedded in compared to other Western countries. In the US the focus lies strongly on bioterror and biosecurity, which has had a big impact on the development of American bio-art. The collaboration between biologists and artists is less strong in the US compared to Europe and there seems to be a more conservative approach towards art-science collaboration. The FASEB competition is a representation of the majority of bio-art initiatives in the United States, which are mostly about pushing artists to reconnect with science, and pushing scientists to utilize this revitalized connection for the greater good of scientific outreach.

Even though every competition has its own definition of bio-art and it's own idea on what it should do, they all seem to have one goal in common: stimulating public engagement. Public engagement can mean many different things but for most of these competitions it means a dialogue between scientists and the public in which they get an insight in the meanings and consequences of scientific actions for society. When it comes to the relationship between art and science most competitions see them as two discrete entities, except for the Wellcome Trust, which is an exception because of its long history with public dissemination of science. The reason the competitions bring these entities together is almost always described as to stimulate debate about the life sciences through high-quality, original artistic practice. In many cases this aim is questionable because the artworks don't have the ability to destabilize or transform the scientific discourse. When looking at the contributions of award winning bio-artworks on scientific, aesthetic and conceptual level the balance is varied. But of all these factors its contribution to scientific research seems to be getting less important. Even though it does remain the norm for bio-art competitions to reward projects with a real scientific content, it isn't

considered the most dominant factor. It is more about the conceptual and artistic results that can be obtained by manipulating living matter instead of the other way around. During the years the competitions have come to see more and more applications and winning proposals that are critical of some aspect of the life sciences or its applied forms. Most bio-art competitions are starting to search for projects that show the more complicated and ethical dimensions around life sciences. That being said, there will probably always remain a certain careful approach in these competitions, an inherent conservatism in where the scheme is coming from that sets limits to critical experiments in art.

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I would like to thank my supervisor Robert Zwijnenberg for his guidance, valuable comments and constructive criticism. I'm also grateful to Monica Bello, David Cahill Roots and William Myers for taking the time to answer my surveys, their answers definitely gave me a deeper insight in the functioning of the competitions.



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**Image 1.1** Eduardo Kac, *Time Capsule* (detail), 1997, live performance/installation.



**Image 1.2** Alexander Flemming, *Germ Paintings*, 1933, photographs, Alexander Flemming Laboratory Museum, London.



**Image 1.3** Edward Steichen,  
*Delphinium flowers*, 1936,  
Installation, Museum of Modern Art,  
New York.



**Image 1.4** Suzanne Anker,  
*Zoosemiotics: Primates*, 1993,  
installation, Hanes Art Center, Chapel  
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**Image 2.1** Jalila Essaïda, *Bulletproof skin*, 2010, photograph of the experiment.



**Image 2.2** Article in *Algemeen Dagblad*, 22 December 2010.

16 **AD NIEUWS** woensdag 22 december 2010

# Superhuid kan kogels weren

**DNA-EXPERTS MAKEN MENSENHUID MET IJZERSTERK WEB VAN ZIJDE**

LEIDEN/ROTTERDAM • Spiderman en Spiderwoman worden werkelijkheid. Wetenschappers in Nederland werken aan een combi van levende mensenhuid en supersterke zijde.

HANS-PAUL ANDRIESEN

Doel is te komen tot een kogelwerende huid. De bio-techniek kan mogelijk worden toegepast bij politie, leger en veiligheidsdiensten. Halverwege volgend jaar moet een stukje 'webhuid' gereisd zijn tot een lap van 40 bij 40 centimeter.

Het Nederlands Forensisch Instituut (NFI) neemt dan de proef op de som met een vuurwapen. De initiatiefnemers krijgen begin deze maand een innovatieprijs en 25.000 euro uit handen van voorzitter Robert Dijkgraaf van de prestigieuze Koninklijke Nederlandse Akademie van Wetenschappen.

Hiermee lijkt het stripverhaal Spider-Man uit 1962 voor een deel waarheid te worden. In het verhaal wordt held Peter Benjamin Parker in een laboratorium gebeten door een radioactieve spin. Daarna wordt hij supersterk en kan vanuit zijn polsen schieten met een soort web.

Het Nederlandse experiment bouwt verder op het werk van professor Randy Lewis van de Universiteit van Wyoming (VS). Door genetische manipulatie is de moleculaire bioloog erin geslaagd om zijde-wormen in plaats van gewone zijde het zogenaamde dragline-zijde te laten produceren. Dit materiaal, sterker dan kevlar of staal, wordt groenelijk gemaakt door een spinnetje, de *Araneus diadematus Nephila clavipes*. Dragline-zijde wordt onder meer gebruikt in kogelvrije vesten.

De Nederlandse onderzoekers willen met de dragline-zijde een 'bulletproof' huid maken. Met het kwaken van huid, onder meer voor slachtoffers van brandwonden en voor de cosmetische industrie, is in Nederland al ervaring opgedaan. Grofweg komt het erop neer dat eerst een spinneweb wordt gevlochten van dragline-zijde. Dat web wordt in een laboratoriumbak gelegd. Daarna worden er huidcellen op kweek bij gedaan. De huid gaat

groeien en (hopelijk) vergroeien met het spinneweb.

Het idee voor de kogelwerende huid is van de Tilburgse kunstenaar Jalila Essaïdi (30). Zij werkt veel met organisch materiaal en had jarenlang een tatoeage. „Ik heb een fascinatie voor huid.“

**GRAP**  
Het experiment begon eigenlijk min of meer als een grap. „Ik las over het gebruik van het spinrag voor veiligheidsvesten. Waarom maak ik geen kogelwerende huid? Ze gaf het experiment de cryptische titel 2.6g 320m%. Dat is het gewicht en de snelheid van een .22 kaliber kogel. Voor de Designers & Artists 4 Genetica-prijsvraag zocht Essaïdi contact met het Forensisch Geneeskundig Consortium, een samenwerkingsproject van drie specialisten van het Leids Universitair Medisch Centrum, het Erasmus Medisch Centrum en het NFI.

„Ik ben blij dat het project van start gaat. Professor Lewis heeft met de coöccenten met zijde-wormen verschoept. Alles loopt op schema.“ Essaïdi heeft er vast vertrouwen in dat de huid de kogel tegenhoudt. „Ik denk vooral aan vredelevende dodevonden zoals bij brandwonden. De zijde is goed tegen imitatieverval.“

Huid josa moet het experiment zijn afgerond. De huid, al of niet met kogelgat, wordt dan tentoongesteld in Natuurhuis in Leiden.

**In de testopstelling wordt onderzocht of een verstevkte huid een kogel kan tegenhouden.**

1 Een stukje levende mensenhuid dat vergroot is met een web van dragline-zijde. Dragline-zijde is een bijzonder sterk materiaal dat ook langzaam wordt in kogelvrije vesten.

2 Kogel afgevuurd.

3 Kistje, volgens de afbeelding, waarvoor het web van de huid.

AI © 2010/11 BY BION JALILA ESSAÏDI

**Het lijkt ongelooflijk, maar de labelachtige huid van Spiderman zou wel eens werkelijkheid kunnen worden.**

**Image 2.3** Maurizio Montalti, *System Synthetics*, 2011, installation, Triennale Design Museum, Milan.



**Image 2.4** Susana Cámara Leret and Mike Thompson, *Aqua Vita*, 2012, installation, MU, Eindhoven.





**Image 2.5** Lionel Billiet, *Concrete Lichen*, 2012, photographs, Naturalis, Leiden.



**Image 2.6** Tido Bakker, *In Vena Verbum – Message in a Vein*, 2011, interactive installation, Naturalis, Leiden.



**Image 2.7** Mathijs Munnik,  
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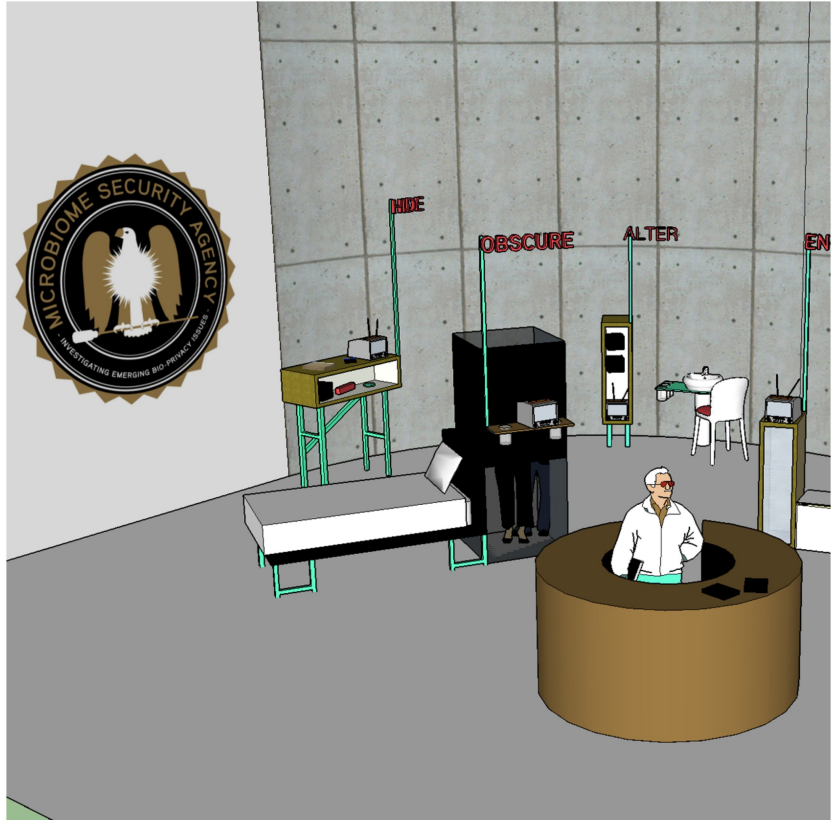


**Image 2.8** Julia Kaisinger and  
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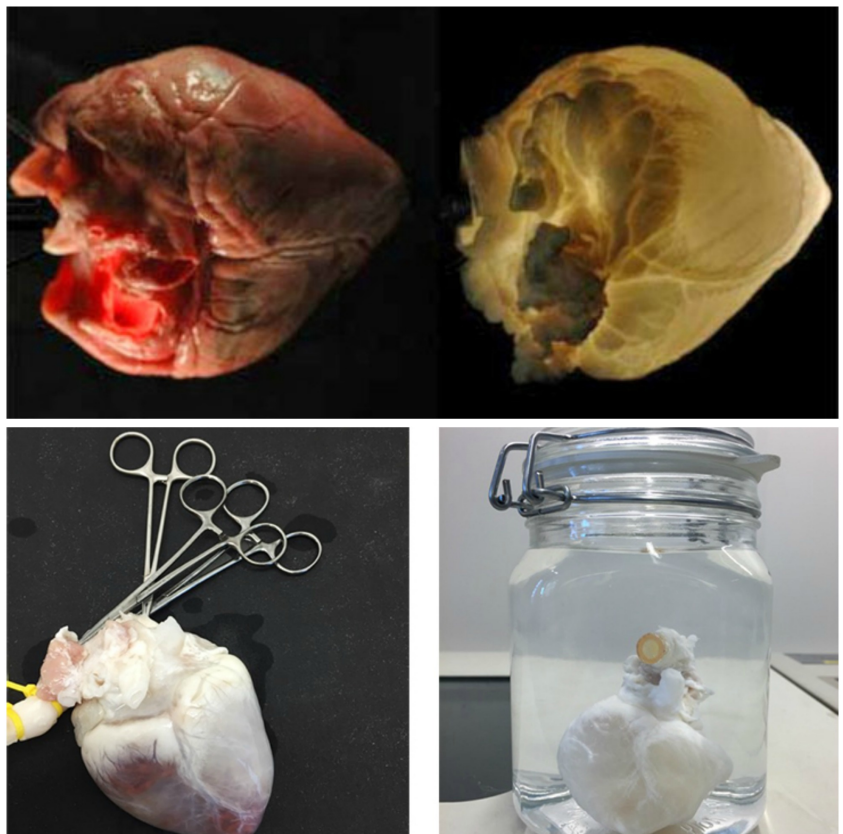




**Image 2.9** Emma Dorothy Conley,  
*The MSA: Microbiome Security Agency*, design, 2015.



**Image 2.10** Isaac Monté and Toby  
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**Image 3.1** Tabitha Moses,  
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Walker Art Gallery, Liverpool.

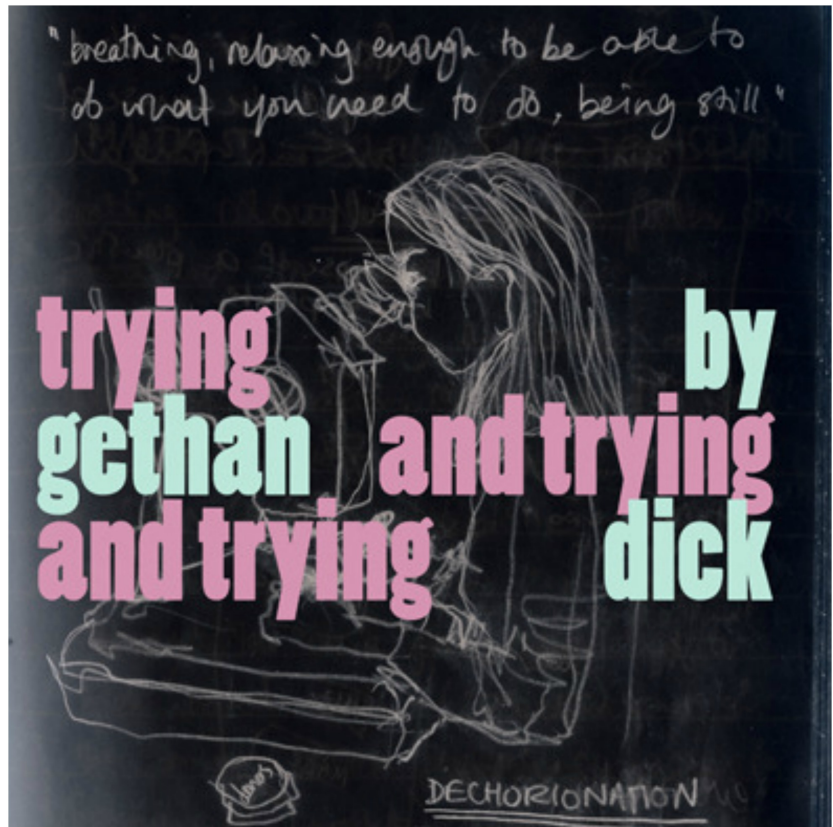


**Image 3.2** Dryden Goodwin,  
*Breathe*, 2010, installation, part of the  
project *Invisible Breath* by Alice  
Sharp, St. Thomas, Cambridge.





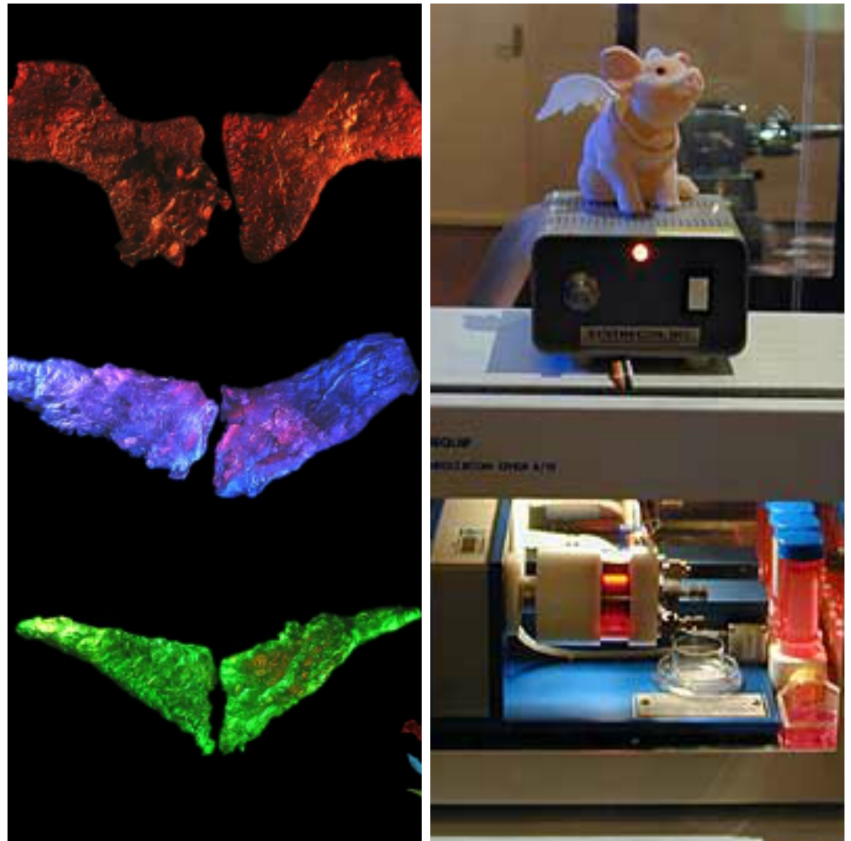
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**Image 3.4** Tina Gonsalves, Chris Frith and Hugo Critchley, *Chameleon*, 2009, installation, Science Museum, London.



**Image 3.5** Tissue Culture & Art Project, *Pig Wings*, 2000-2001, Tissue Engineering and Organ Fabrication Laboratory, Massachusetts.

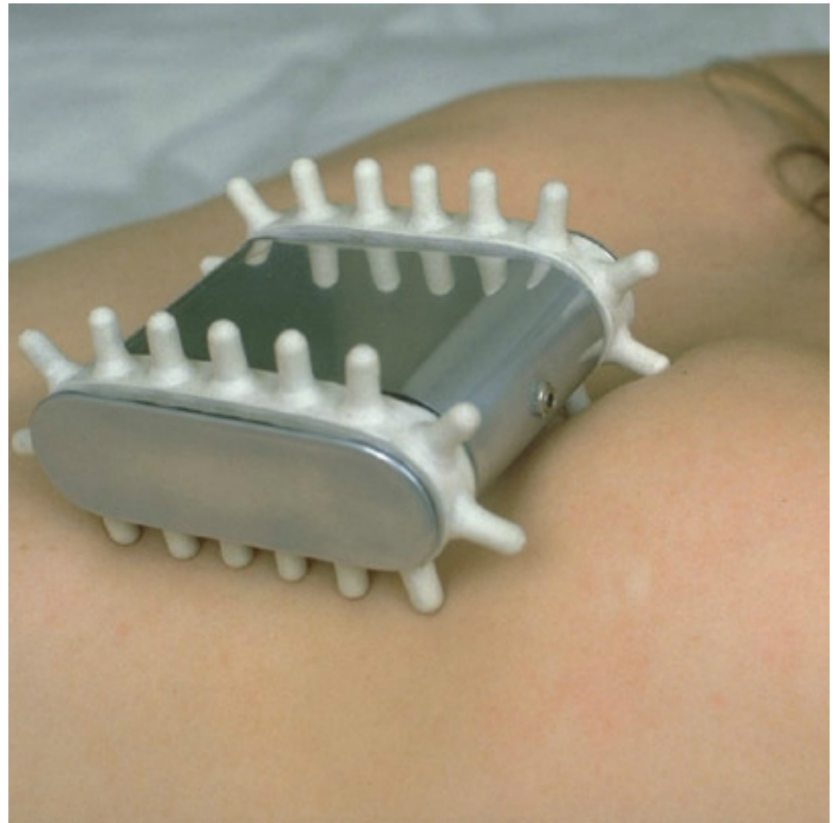


**Image 3.6** Mark Storor, *For The Best*, 2010, Dance Rehearsal, Liverpool.





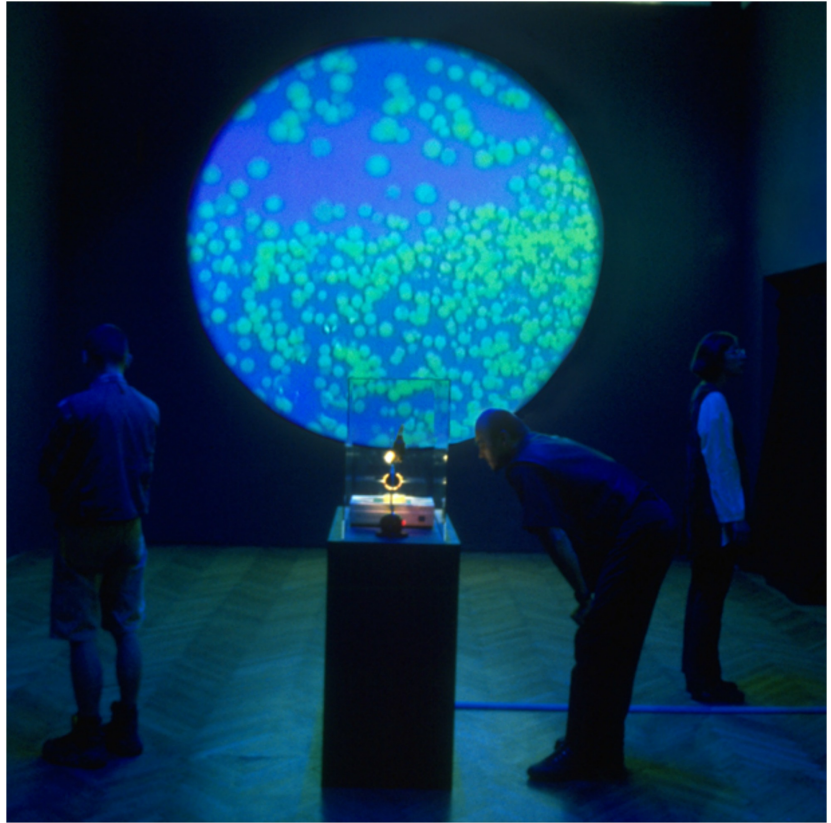
**Image 4.1** Erwin Driessens and Maria Verstappen, *Tickle*, 1999.



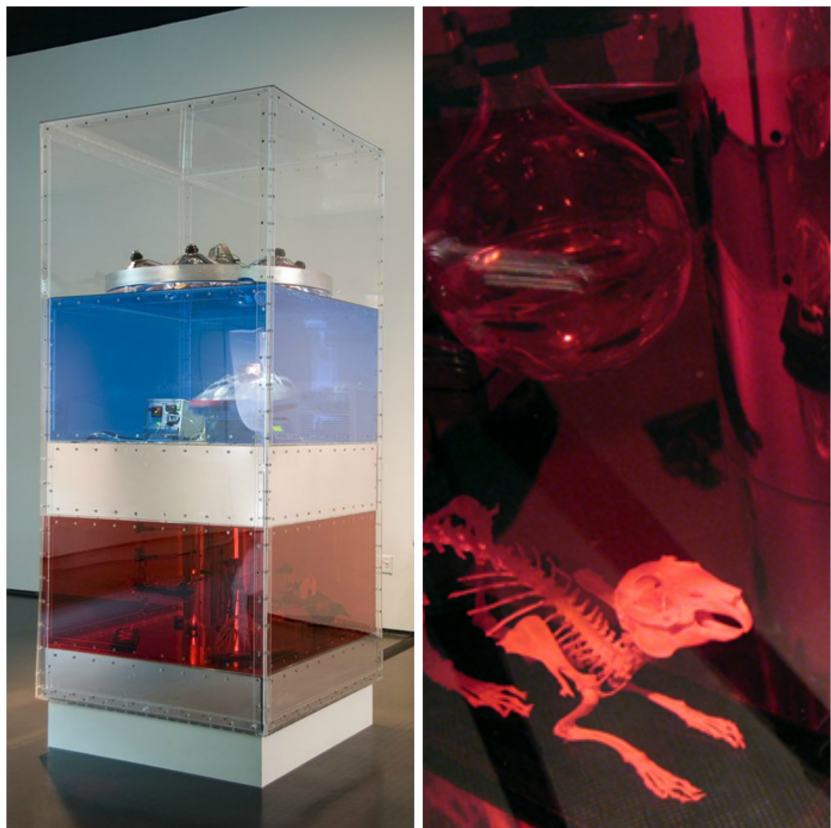
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**Image 4.4** Oron Catts and Ionat Zurr, *NoArk*, 2007, Installation, RMIT Gallery, Melbourne.





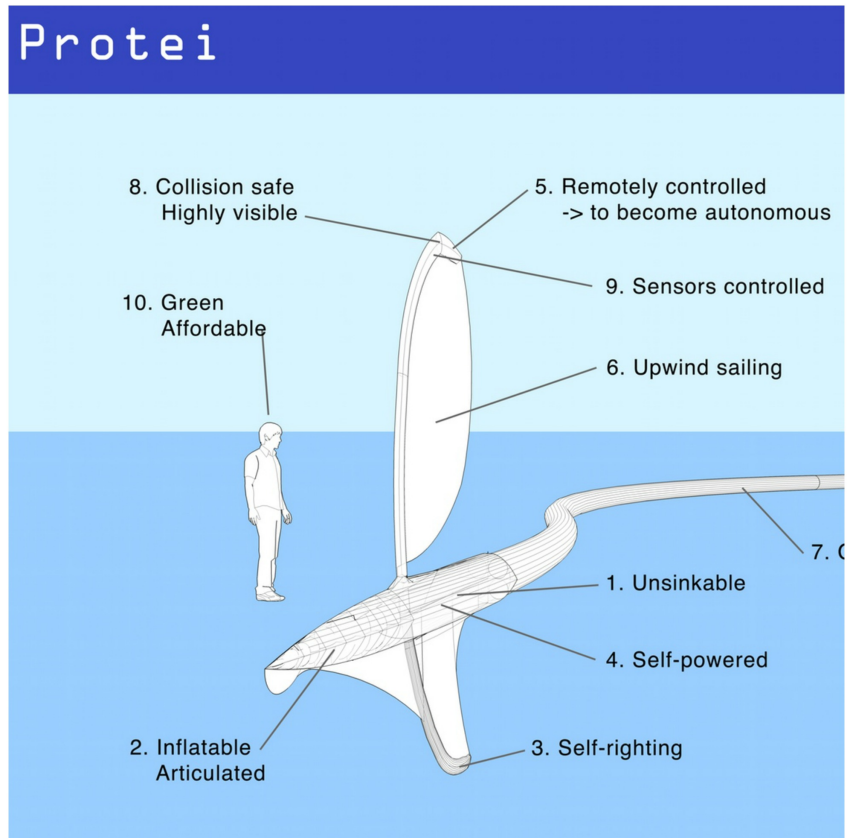
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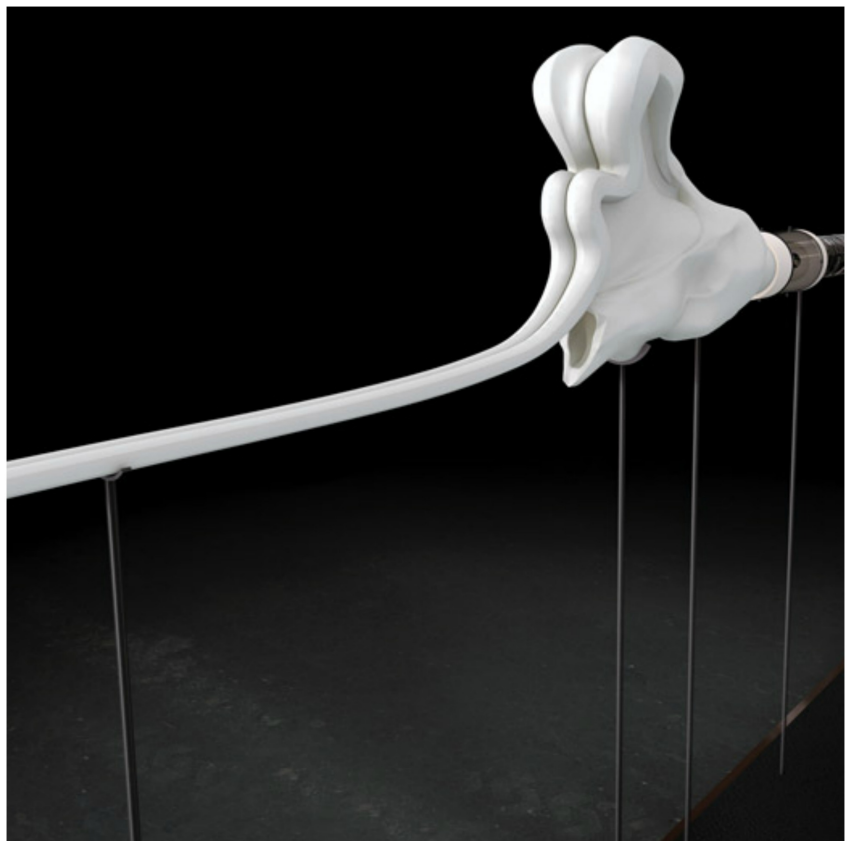
**Image 4.6** Marion Laval-Jeantet, *Que le cheval vive en moi*, 2011, Performance, Ljubljana.



**Image 4.7** Cesar Harada, *Protei*, 2011, prototype design.



**Image 4.8** Marguerite Humeau, *Mammoth Imperator* part of, *Back, here, below, formidable*, 2011, prototype design.

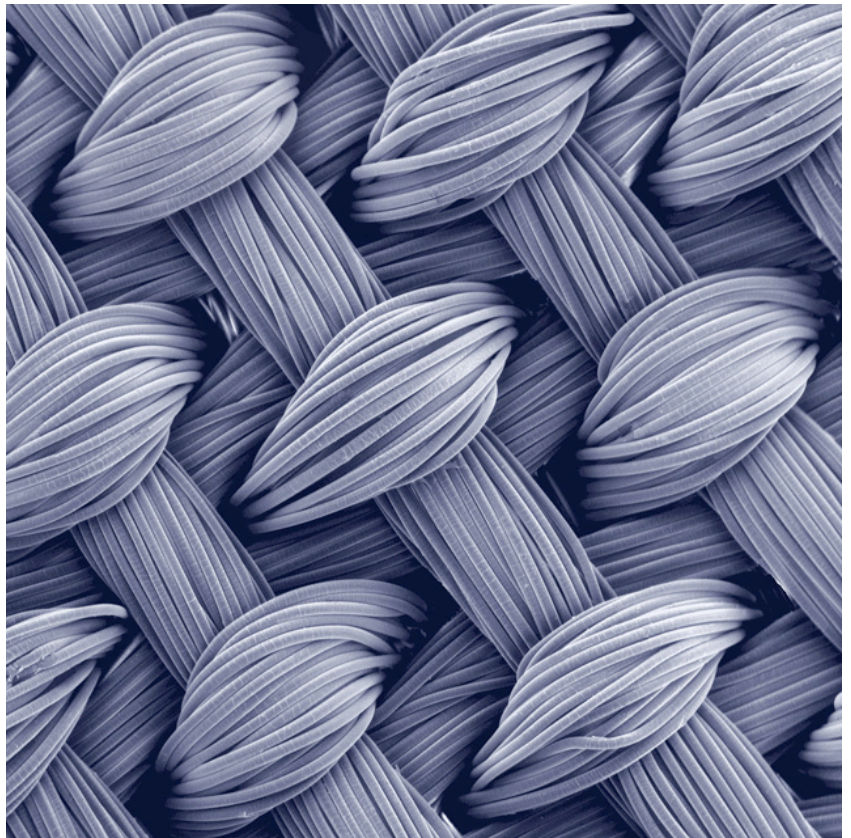




**Image 4.9** Vicky Isley and Paul Smith, *Ornamental Bug Garden*, 2004, computational system, DAM gallery, Berlin.



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## Attachments

### Questionnaire William Myers

Curator and jury chairman of the Bio Art & Design Award

- 1. Do you believe the scope of bio-art should be strictly limited to “living forms”, or can art that uses the imagery of contemporary medicine and biological research also be considered bio-art?**

*Good question. The short answer is that I consider bioart to include much more than living media. The long answer: Over the course of writing the book BioDesign (2012) I encountered numerous examples of artists blazing a trail toward new ways to think about nature and the self, often using living tissues and microorganism cultures or even constructing complex ecosystems. They seemed to be testing, playing and discovering new forms of expression and articulating positions on what are I have come to regard as the most urgent issues of our time, the era of the Anthropocene. Several of these examples found their way into BioDesign but it was clear the topic of bioart warranted further study, and a called for a new book of its own. How are the two different? Biodesign is a practice integrating biological processes and cycles within ecosystems into manufacturing and building. Living material often becomes a part of the finished product in biodesign that, importantly, as a design enterprise must in some way relate to utilitarian application, even if consciously rejecting the concept or critiquing the brief. Design therefore must be directed in some way toward others, art may not. Bioart, in contrast, is a practice utilizing living biology as medium or addressing the changing nature of biology’s meaning. This can happen on a petri dish or in a photograph. What is defining is the work’s connection with meaning in flux. In this case, bioart is a response to the cultural dislocations erupting from the advance of life sciences research and its application as technology. As areas of study including biomedicine, ecology and synthetic biology advance our shared, foundational cultural concepts of identity, nature and our relationship to the environment are shifting. An important backdrop to these changes is the era of the Anthropocene, the geological epoch we have entered that is characterized by human impact on the planet’s atmosphere and ecosystems. This includes destruction of habitats, mass extinction and climate change and is a key element in the crisis of consciousness many artists respond to with bioart. The range of issues bioart engages also includes new understandings of the self. As artists like Stelarc have provocatively argued, the “body is obsolete” in light of the possibility of technological extension and networking. This line of thinking takes another step with genetic medicine, the ability to generate eggs and sperm from one donor’s stem cells or the manipulation of gut microbes to manage mental health. Research in the life sciences in this century will undoubtedly be regarded in the future as a golden age. It is a place of accelerating breakthroughs and fundamental developments, such as the rise of epigenetics, revealing how we are all in fact in meaningful genetic communication with our ancestors as well as future generations. This pace of discovery creates fertile ground for artistic expression, and calls for art as exploration and translation of what are truly jarring developments in our time.*

- 2. Do you believe art-science collaborations can only be successful when the artists involved make art that scares, unsettles or disrupts the audience?**

*No. They can do very different things. However, a lot of recent interesting examples do those things, I argue that they echo the techniques of the Surrealists in wielding the uncanny. For more on that the new bioart book I wrote should be a helpful resource.*

- 3. Do you agree that there are a lot of bio-artworks that function as a form of advertisement for the life sciences?**

*No, but I do agree that there should be many more bioart examples that contest and complicate our typical acceptance of the life sciences and their application.*



**4. Do you believe art can truly change us and our way of thinking, or is that just a prophetic vision?**

*Art can truly change us and always has been doing it. Artists are often the first ones to realize cultural shifts underway and are compelled to respond to them.*

**5. If you would have to name one bio-artwork as the figurehead of your competition, which artwork would this be, and why?**

*Really I could not.*

**6. Do you have the idea that the Bio Art & Design award has changed during the years of its existence? In what way? Do you see this as a positive transformation?**

*I believe it's become more international and has slowly come to see more applications and winning proposals that are critical of some aspect of the life sciences or its applied forms, like biomedicine.*

*All bio-art competitions seem to strive for some form of public engagement. However it remains an amorphous entity, as a term it seems to mean different things to different people. For some, it refers just to 'dialogue', where there is genuine discussion between scientists and the public; for others, it is about the importance of the public voice being fed into scientific policy making; for others still, it covers the full panoply of activities in which scientifically trained or active individuals interact in some way with people or groups without a scientific background. What does public engagement mean to you, and to your competition?*

*As the head of the jury, I have an opinion on this but it's best to ask ZONMW about what engagement means to the competition, since they fund it.*

*As for my opinion, I think any competition like this is a useful platform for staging interactions between specialists and non-specialists in the sciences, so it makes sense to use it! It's not the end goal however, more like a nice to have feature always being considered. Ultimately a competition like this is about supporting a high quality project.*

**7. Do you believe bio-art competitions can give us a specific insight in what is going on in the world of bio-art, compared to other organized events like bio-art exhibitions put together by curators?**

*To me an exhibition is usually more rich because it generally includes more works and has the opportunity to mix older and contemporary works together, in support of a particular theme or thesis. In contrast a competition is usually just a showcase of a few winning projects.*

## **Questionnaire Monica Bello**

Curator and artistic director of VIDA

- 1. Do you believe the scope of bio-art should be strictly limited to “living forms”, or can art that uses the imagery of contemporary medicine and biological research also be considered bio-art?**

*I could start by saying that I am not totally comfortable with categories such as bioart. I think many artists commonly related to this particular area of research would agree with me on the fact that such categories only serve to the purposes of certain art sectors that are beyond the creative process of multidisciplinary research. Despite of that, and in order to answer your question, I want to say that the challenge of bioart - as this particular framework of art practice - only can be understood as art with living systems as complex systems, or as artefacts that offer some meaningful arguments around what is life, for instance "what are the boundaries between living and non living", "how do relate to other species", "what are the cultural boundaries of knowledge when we approach life as living things", etc. Imagery of contemporary scientific facts (on life) I think is not near this and should not be related to bioart.*

- 2. Do you believe art-science collaborations can only be successful when the artists involved make art that scares, unsettles or disrupts the audience?**

*Absolutely not. I do not agree art needs to perform in such a fashion to be valid in any field.*

- 3. Do you agree that there are a lot of bio-artworks that function as a form of advertisement for the life sciences?**

*I think that can easily happen when there are so many interests involved in the science and engineering of life. However, it can be avoid if the artistic process is developed following a rigorous method of research and presentation - that only can be seen as art, critically engaged art.*

- 4. Do you believe art can truly change us and our way of thinking, or is that just a prophetic vision?**

*Neither way, I think art help us to envision new ways of understanding the world, nature, ourselves, etc, but I would not advised to think of art as a tool of improving our conditions or our commitment with the world. I would think that as part of a rather neopuritan trend.*

- 5. If you would have to name one artwork as the figurehead of your competition, which artwork would this be, and why?**

*Se mi sei vicino by Italian artist Sonia Cillari*

- 6. Has the VIDA Awards changed during the years of its existence? In what way? Do you see this as a positive transformation?**

*VIDA was a project that illustrated the debate around art and life in the last 16 years. That makes VIDA a very unique project that helps us to understand the development of a type of art that engages to advance knowledge and technical innovations. VIDA has changed through all this time by this process awarding artists that were committed to explore art as research.*

- 7. All bio-art competitions seem to strive for some form of public engagement. However it remains an amorphous entity, as a term it seems to mean different things to different people. For some, it refers just to ‘dialogue’, where there is genuine discussion between scientists and the public; for others, it is about the importance of the public voice being fed into scientific policy making; for others still, it covers the full panoply of activities in which scientifically trained or active individuals interact in some way with people or groups**

**without a scientific background. What does public engagement mean to you, and to your competition?**

*We can go back to the 60's to analyze the term of participation, and a bit later to start to talk about interactivity. That to say the art that explore performativity technologies relates on the audience to create meaningful exchanges. It was a way to take art beyond the safe scenarios of artistic individuality and became an art more engage with its environment or ecosystem. I think this formula still works when we talk about art-science encounters. In this process as you say we find many different variations of engaging with audience, communities, formal knowledge, etc, but the core idea remains the same.*

**8. Do you believe bio-art competitions can give us a specific insight in what is going on in the world of bio-art, compared to other organized events like bio-art exhibitions put together by curators?**

*A competition is a non curated event and - depending on the rigorous of the selection process - can support the work of researchers and curators. It is the case of VIDA with no doubt: VIDA is considered a very valuable source of understanding the development of art-science and technology framework.*

## Questionnaire David Cahill Roots

Arts Manager at Wellcome Trust

- 1. Do you believe the scope of bio-art should be strictly limited to “living forms”, or can art that uses the imagery of contemporary medicine and biological research also be considered bio-art?**

*I don't believe bio-art is restricted to living forms, if you mean performance vs still image or visual arts. But there's a difference between the work a visual artist might make through an Arts Awards and imagery of contemporary medicine/biological research.*

*Within the arts awards, we're less interested in supporting the representation of science, so imagery of contemporary medicine and biological research really only become interesting where they are part of an artist's critical engagement with a subject. See for example:*

*<http://thomson-craighead.net/stutterer.html> or*

*<http://www.tabithakyokomoses.com/page10.htm>*

*As opposed to*

*<http://www.wellcomeimageawards.org/>*

- 2. Do you believe art can truly change us and our way of thinking, or is this just a prophetic vision?**

*I believe that art already has a place in our culture and our society and that without it we would be weaker. More specifically then, I believe individual works can offer different insight and perspective and challenge our view of ourselves and our place within the world – so yes, I believe it can change our way of thinking.*

- 3. Bio-artworks are sometimes being criticized for purely functioning as a form of advertisement for the life sciences. Do you understand where these critiques are coming from?**

*Yes, absolutely. I suspect there's a point in the early history of many of these schemes where that was an intention. And I understand the assumption that one would draw about an organization with a remit to support biomedical science supporting the arts. It's not unreasonable to conclude it's about PR.*

*We ask artists to work in collaboration with researchers, and the assumption that the artist will just help promote their research is one of the things people have to negotiate in a new relationship. Most of the artists we work with through the Arts Awards would run a mile if they felt we were offering funding for them to advertise science. But very often as a result of the dialogue they have with their scientific collaborators, they choose to communicate something of that research as a way of opening up the dialogue with an audience.*

*The key thing is that we trust the integrity of the artists and scientists we work with. They have to be free to engage, interrogate and create as they see fit.*

- 4. If you would have to name one bio-artwork as the figurehead of your competition, which artwork would this be, and why?**

*Mark Storor's For The Best remains a stand-out piece of work for tackling an incredibly tough area head on and for the depth of engagement within Marks' practice.*

*<http://www.theguardian.com/stage/2010/nov/15/for-the-best-mark-storor-interview>*

- 5. Has the Wellcome Trust Arts Award changed during the years of its existence? In what way? Do you see this as a positive transformation?**

*I think one of the big changes is dropping any terminology around bio-art or sci-art, which suggest this work is significantly different from any other sort of art. I guess there's an inevitable desire to put work in boxes, but if we get things right the results of our Arts Award funding should (and do) exist as outstanding pieces in their own right.*

- 6. All bio-art competitions seem to strive for some form of public engagement. However it remains an amorphous entity, as a term it seems to mean different things to different people. For some, it refers just to 'dialogue', where there is genuine discussion between scientists and the public; for others, it is about the importance of the public voice being fed into scientific policy making; for others still, it covers the full panoply of activities in which scientifically trained or active individuals interact in some way with people or groups without a scientific background. What does public engagement mean to you, and to your competition?**

*All of the above. I think it's about highlighting how science is relevant to people's lives and creating a space where they're able to question and challenge and perhaps influence future research. It's about finding a way for people to meet as equals.*

- 7. Do you believe bio-art competitions can give us a specific insight in what is going on in the world of bio-art, compared to other organized events like bio-art exhibitions put together by curators?**

*We don't really run a competition. It's an open application grant funding scheme. I'll grant you, it probably looks a bit like a competition. Our funding can lead to all sorts of different outcomes in all sorts of different places, so I'm not sure I've got a useful answer here. As in Q5, I accept there can be something more challenging about the work we fund, but I'm not really interested in putting it within a bio-art sub-culture.*