



**Looking to Draw:**

**Picturing the Molecular Body in Art and Science**

A thesis submitted in partial fulfilment of the requirements  
for the degree of Doctor of Philosophy.

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Looking to Draw  
Picturing the Molecular Body in Art and Science

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## Abstract

**Thesis title:** Looking to Draw: Picturing the Molecular body in Art and Science

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As a practice-led thesis comprised of drawing, sculpture, video, notebooks, and a written dissertation, this study by way of art making argues against the provocation that life sciences aided by the advances in visualizing techniques will hegemonise much of what there is to see and know about biological life. Historian James Elkins argued that non-art informational images were historically relevant considering the strategies scientists use for visualizing phenomena and W. J. T. Mitchell noted the impact of proliferation in image production together with computer technology as the epistemological shift from word to image and coined the phrase pictorial turn. Concurrently philosopher Gottfried Boehm deployed the term iconic turn to discuss the problematics associated with the power of images. I incorporate these insights to examine the affects of biomedical imaging as seen in artworks formed out of biologically sourced organic materials and techniques. Especially once grouped as Bio Art (Kac 1997) or organic media art (Hauser 2006) these artworks further accentuate the problem of representation and its relationship to knowledge and power underscored by the phenomena that biotechnology is changing perceptions of what the body is and can become.

The written component of the thesis addresses these problems. It does this by critiquing visualization through the example fluorescent tagging as this technique exemplifies the most innovative and transgressive procedure for imaging biology in-vivo. I argue the following: the visualization of biology, like the mathematization of the surface of reflection pioneered by Ibn al-Haytham is not a problem because it shows Man's technological prowess but rather because mathematization brings with it the legacy of ontological uneasiness with images in Western philosophical tradition. This tension persists and gets exacerbated especially in contexts where molecular scale visualizing aids the invention of novel life forms as art or laboratory creatures.

To reconcile the paradoxes that emerge from critical analysis of the effects of biotechnology that have been discussed in binary terms such as natural or artificial, mimetic or real, I introduce to the lexicon of new media art and theory the concept of non-duality from Arabic philosophy formalized by Ibn 'Arabi through the analogy of *barzakh*. In Ibn 'Arabi's scheme images are a part of the imaginal sphere and are not perceived as mimetic. Neither is the image given primacy in the formation of knowledge nor is the image given an absolute position of certainty. Instead, images are the intermediary and dynamic part of cognitive process that brings with reason knowledge and with knowledge, responsibility.

Thus theorized, imaginal are able to facilitate the possibility to actualise the fullest comprehension of *wujud* that in translation is also the pursuit for knowledge that guides action. In this way informed by practice, this thesis dissolves the distrust of vision and proposes that scientific images are like art that can embolden the intellectual capacity for creativity and abstract thought.

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## **Thesis outline and chapter breakdown**

The ability to see the self on a reflective surface is foremost a perceptual experience, and a reflective surface is the first device for seeing the self. A survey of World legends will confirm this. We can see in the things and objects, time, and in the forms of things eyes of the makers and their relationship with devices that shape the appearance of things.

The dissertation entitled *Looking to Draw: Picturing the Molecular Body in Art and Science* is a study of the relationship of art and technology focused on changes in perception that happen as a result of looking at the body through specular devices used in molecular biology. The core problematic of the dissertation does not rest in the techniques of visualization, the making of the scientific image or the truth content of the molecular scale representations of biological matter. The history and the outcomes that present themselves in the mathematization of the surface of reflection is the central concern of this dissertation. The writing, drawing, video, and text are a means to present a critique of seeing in the fashioning of the rational self.

In order to resolve the methodological difficulties that present inter-disciplinary practices involving artistic research, I have divided this project into three parts.

The first two parts comprised of drawings, video, sound, sculpture, notebooks and poetic text come together in book format titled *Looking to Draw* which documents the practical parts of the thesis in volume One. Subtitled *Notebook* is designed as an artists' book that side-by-side with the exhibition slides and text of the dissertation will create a generative space between theoretical writing and the art making. As a document akin to an exhibition catalogue, the *Notebook* doubles up to further explicate the artworks and links the studio practice with the greater methodological and artistic concerns of the thesis that may not always be apparent, especially given the abstract nature of the drawings.

The exhibition *Looking to Draw* is arranged to accentuate the play with scale, light, and darkness in the artwork has been used as a trope to critique the sensible features of scientific imaging. For instance, on a formal level the drawings are monochromatic and made by a use of techniques that are difficult to reproduce by mechanical means. As a further strategy to explore the bind of vision and violence, I bring to the surface latent connections

between military history and medicine that can be seen in drawings titled "Molecular Warfare", "Full Colour I, II & III" and "There is Plenty of Room at the Bottom" for example. In this way, the exhibition forms an experiential encounter with the power and force of visualization apparatuses that accompany rationalization processes, especially as the drawings juxtaposed with "Dol Bel, Full Fake & Rain" all together create a space to contemplate the underlying violence imbued in the making of the rational self.

Part Three, *Picturing the Molecular body in Art and Science* makes up the more obviously theoretical and textual part of the research project in volume II. The writing forms a critique of visualization apparatuses that have come to symbolize modernity in support of a rather mechanistic purview of biology exemplified by artworks that are grouped together under the rubrics of Bio Art. Methodologically eclectic, the writing draws on literature from the disciplines of history and theory of art, history of science, molecular biology, medieval scientific manuscripts, early Arab philosophy, and new media art theory. The dissertation is further divided into three sections, each section is subtitled: To See, To Do, and To Be.

As a complete project, this undertaking aims to make a positive contribution to the scholarship on the history of vision and the underlying tension between nature and technology. There is a difference however. The methodological framework of this research with studio practice has made the process of this thesis one which the cost of unlimited human capacity of creativity is expended, while at the same time making one's hands dirty; thereby informing the direction of both the practice and theory.

## **Section One**

"To See" is divided into four chapters in order to address the issues that I think are critical to the field of art and molecular biology. Chapter 1 introduces the problematic by a discussion of the reception of the Platonic polemic against *mimesis* within the different groups represented by Arab philosophers and the Scholastics. To locate points of disjuncture between cultures, I take ideas from Hans Blumenberg's essay, "Imitation of Nature", and use his methodological framework to explicate the dissimilar ways in which Plato's philosophy is implicated in the way creation and creativity of Man is thought about in different cultures. For the project of modernity, the ultimate symbol

of Mans' prowess over nature is creation of life out of nothing or synthetic resources. I contend that these foundational ideas are connected to the development of art making practices that involve working with live biological materials. In this chapter, I also introduce Ibn 'Arabi's concept of *barzakh* as a means to open up the possibility of a nuanced reading of arts of the Muslim world in general, and its attitude to creative process. The image and the imaginal in Ibn 'Arabi's philosophical synthesis is a means for knowing and finding out. To further this line of thought, in Chapter 2 I bring into the discussion the twofold history of the reception of *Optics* of Ibn al-Haytham represented by the original Arabic and later Latin versions. I concur with Belting's thesis that differences in appreciation and interpretation of the text of *Optics* indeed form cultural attitudes. In addition I note that more than its impact on art, the experimental method outlined in the *Optics* of Ibn al-Haytham makes the operative logic of the scientifically intended image, which is to treat images as ways of finding out. The two chapters are also methodologically linked with sets of drawings titled "Infinite Spread" and "There is Plenty of Room at the Bottom" that were made as a contrast to scientific images and designed to create a space to draw in the viewer, not to make pictures of things pre-existent.

In Chapter 3, to further the discussion of the mathematics of optics, I argue that the mathematization of the visual space differentiates the ways of knowing and doing things represented by art and science. I propose that artists and scientists do not make images. However, both artist and scientists are joined in the abilities to manipulate how things get seen. In the hands of the master manipulators, the visualization techniques used in molecular biology, the pictorial turn described by W. J. T. Mitchell becomes further problematic. This is not because biology has become increasingly pictorial. It is because biology is prescribed in the language of mathematics, and adds to the problem twofold. First, the language of mathematics represents an abstract language. Second, language and writing represent iteration. The mathematization of biology, coupled with graphic modelling software capabilities, do not simply disclose new ways of knowing, they change thinking. What fundamentally changes is the relationship of the self and the world. Not only do these ideas open up the site of the body as a source that could allow infinite construction of the body and world, but also the idea of infinity is problematic precisely as it has a long association with the boundless ability of nature to regenerate. Drawing ideas from Brian Rotman, I concur that once nature is aligned with infinity or eternity it becomes a problem of excess, and

waste. This excess is a result of the mixing of the materially 'real' of nature with the ideal of number.

To discuss the impact of mathematically visualized biology, Chapter 4 unpacks the strength of ideas imbued in molecular visualization techniques through the transgenic artwork titled "Alba" by artist Eduardo Kac. For example, W. J. T. Mitchell raised the ethical dimension associated with mechanical means of reproduction in 2003. Whilst agreeing that cloned animals compromise basic values of dignity of life, I maintain that the transgenic additionally symbolize a class of sub-species upon which the state can exercise exceptional powers as theorized by legal philosopher Carl Schmitt. The objections that Mitchell raised are more than a critique of the symbol of technological advancement. The problem he argues is complicated precisely due to the very configuration of computer technology that can theoretically reproduce the biological indefinitely and this way it can also perpetuate cruelty. Therefore, as much as the transgenic are an ultimate show of knowledge, knowledge is power. It is with power that a state or large corporations can exercise the absolute legislative rights with impunity. To further critique the transgenic as a symbol of technological merit, I conclude Section One by comparing the transgenic in art with the transgenic in medical research. Especially, as cancer research also involves the use of

transgenic animals. I argue that with all the might of visualization apparatus, we are unable to tell why programmed cell death fails to occur. Cancer does not simply symbolize unbridled proliferation (potential repetition ad-infinitum). It presently characterizes the extreme challenge to representative systems of knowledge making.

## **Section Two**

"To Do" addresses the impact of the techniques of visualization as they change ways of doing things. In this section, I reintroduce the work of thirteenth century Arab philosopher Ibn 'Arabi and his philosophical terms to address anew the moral and ethical unease attached to the techniques of molecular biology, the engineering of new life forms symbolized as the general unease with technology itself. Section Two is divided into chapters 5 and 6. Chapter 5 builds on the discussion of the increased possibilities of molecular biology as it is inscribed in the language of mathematics. I propose that it is precisely because genetic material is mapped out in the abstract language of numbers that it becomes possible to write and re-write the biological figuration of the body over, and over again. This being or body that appears is not a copy of a pre-given original, but materializes each time as a new

improved original. In the mixing of the ideal with the real, Platonic mathematics with Aristotelian physics, visualization processes further make the way for a fundamental break with the imaginary world. For example, Jorge Luis Borges listed references to imaginary creatures from across cultures and continents in *The Book of Imaginary Being*. Technological advances in molecular biology today however theoretically make it possible that the imagined no longer must remain confined to the domain of the virtual. I argue that it is precisely in the mingling of the artistic with the scientific that complicates the ethical unease with the more therapeutic functions of molecular biology.

Drawing from Peter Galison's article that outlines problems facing the history and philosophy of science, I take up the ethical dimension described by Galison as the problem of "Making Things" that surface with the transgenic or living artworks. To further open up the parameters of these debates, I introduce to the discussion the philosophical term *wujud* being, as it is used by Ibn 'Arabi in his writings. By bringing in the philosophical dialogues that took place in the Abbasid courts over the nature of creation of the world, I connect the debates of the past with key bioethical deliberations over the definition of what life is and can be with the emerging field of molecular biology. I propose that the thirteenth century debates are

not just relevant, they are topical in the way they address the question of life and being as encompassed in term *wujud* because how life came to be represented limits to rational reasoning then, as it does today. Due to the plasticity of the term itself, *wujud* is the methodological means to undo fixed perceptions of being and becoming in a way that is open to new ways of doing things.

To further problematize the ethical debates over new technology, I made works titled "Dol Bel", "Flies the Night Sky", and "See and Thirteen Others" as a way to elaborate on shared histories of vision, technology, military, and medicine. The contemporary bioethics debate over the issue of using novel reproduction technologies and the designing of new life forms appear as a cover for the military inflicted acts of violence that threaten the sanctity of life more than any bit of biomedical research. Military apparatuses have the capability to obliterate life, a power that might never be exercised as experts have argued, however. Perhaps it is worth noting that the first process of destruction of life takes place in the destruction of the markers of civilisation itself as exemplified in times of war.

### Section Three

"To Be", Chapter 7, makes the final and concluding part of the dissertation. In Section Three, to think about scientific limits facing molecular biology in answering how organic life first started, I briefly outline the journey of Aristotle's book *De Anima* as it has influenced both scientific discourse and philosophical systems that intuit from theology. Very much like the ancient and medieval philosophers, the problematic with increased knowledge of the biological body, for instance in the molecularization and mathematization of biology, is that we are no closer to knowing what 'life' is, or how it happens. Why a particular arrangement of matter has the ability to self-start remains a mystery, similarly complex scientific images tend to evoke the mysterious. *Anima* in Latin, or soul in English was Aristotle's definition to think about that which makes organic life distinct from all other kinds of matter. Aristotle defined this distinction as *psuchê* and simultaneously introduced a split between the concept of life and living to the domain of philosophy. This point is elucidated by Eugene Thacker, who introduces a way to think alongside the mind and body division with what he calls "ellipses" as an alternative to binary propositions that

dominate Western philosophy. I propose that Ibn 'Arabi's philosophy and the term *wujud* is also a way to think out of the dualist precincts. In making this claim, I bring to a circle ideas developed around the concept of *wujud* being during the course of this dissertation. By taking advantage of the lexical breadth of the term *Wujud* that is also searching, and finding, I methodologically explore the making of scientific vision, and use the term to critique the making of the image of the scientific self. It is precisely because *wujud* is linked to *barzakh* (that functions as the imaginal plane that is both the mechanism to overcome limits to rational methods of reason and at the same time represents conceptual limits to rational knowledge itself) that makes it possible to think critically about what it means to be rational. Moreover, I make use of this term as a defining marker that contrasts material computation or material knowledge with conceptual grasp of knowledge. Whether or not Alba symbolizes an auspicious animal, the future of life perhaps does not rest upon the capacity to build novel life forms molecular scale up. Surely, is not technological prowess, or world that is reduced to representation that Martin Heidegger discusses in his essay "The Age of the World Picture" that generates violence, or is the reason for world conflict? The challenge begins when representation is taken as the only measure of reality,

knowledge making, or knowing. The problem is manifold and includes politics and economics of control and distribution of what is determined to be scientifically valuable. I argue that to know is not simply to know ways of seeing things or making things. The ultimate test of knowledge and knowing as symbolized by *wujud* is prudence and the ability to show restraint. However, restraint can only come into practice with actual limits, that is, to acknowledge all life is finite.

Together with the concluding section of the dissertation, to think about the nature of creation and the aggressive relationship of man and technology, I do not offer a pessimistic reading of technology. Artworks titled "Senses 33" and "Salt" were made to think about the relationship of human intellect with technology and creativity to consider the possibility that perhaps progress, development, and knowledge do not rest upon conquering nature of the world, but the nature of self. To understand this is to know how to be, but this is difficult to represent.

