

A detailed botanical illustration featuring several large, vibrant green leaves with prominent veins and serrated edges. In the lower center, there is a cluster of small, light-colored flowers or buds on a thin stem. The background is a soft, light green wash with faint, larger-scale leaf patterns, creating a layered, artistic effect.

# **‘HOW DO PLANTS TAKE SELFIES?’**

An exploration of the  
relationship between artists  
and biologists.

# Contents

	Page number
<b>Broad outline of context of study: Methodology</b>	<b>3 -5</b>
<b>Data collection rational</b>	<b>5</b>
<b>Critical analysis</b>	<b>6 -9</b>
<b>Key issues</b>	<b>9 -13</b>
<b>Interview</b>	<b>13 -14</b>
<b>Conclusion</b>	<b>15</b>
<b>How the investigation has informed my practice</b>	<b>16</b>
<b>References</b>	<b>17</b>

# Methodology and implementation

## The context of the project


The project is set within the context of art and artistic illustration, as a working tool for biologists set against biologists developing their observational skills, and the symbiotic relationships involved.

An exploration of the collaboration between artists, biologists and the resulting current trends in data representation.

A brief description of the methodology:

- Research into the relationship between art illustration and observational skills.
- Research into the current trends in teaching Biology via an interview with a current working professional.
- Likert survey of people's opinions.
- Personal statement.
- Personal investment and reflection from a young age, reflected in my work as an artist/graphic designer.

The justification for this investigation lies within growing research. The research undertaken draws on current literature which supports the argument that at the centre of biological study, are observational skills. Which lie in the realm of the artist and the dichotomy between both disciplines. Nature inspires art, but conversely, art can also aid biological understanding, which in turn, can help the appreciation and conservation of art works. (M.Gross.,2013) The effective engagement and use of illustration skills can inform the process of self-evaluation. Also, the planning for the purpose of raising attainment of new knowledge through the time invested in the study of biological subject matter, versus the quick attainment of illustrations produced by artistic impressions and computer aided modelling. I am therefore investigating examples of symbiosis across the 'two cultures' and the divide.



The research undertaken shows the relationship between effective use of time and the potential to develop new knowledge and understanding through the reintroduction of drawing skills for biologist.

The current argument that all scientific illustrations are produced through the use of an artist has led to a loss of observational skills, which are fundamental skills needed by biologists. 'A century ago, drawing was taught as an essential skill for scientists, valued for communicating findings, but also for enhancing observations. One biology professor laments this loss and aims to incorporate drawing back into her introductory biology courses.' (J. Landin., 2014.)

Set alongside the functional aspect of using data collected, through my survey to effectively stimulate engagement in professional dialogue between artists and scientists, which is embedded and centred in quantitative evidence, this action can lead to reengagement and investment of drawing skills by biology teachers.

'Examples of biology and art influencing each other describe what amounts to little more than a one-way street, with artists being inspired by living organisms, by biological research, or by the results of such research. It's more difficult to find examples of scientists being assisted by artists beyond producing illustrations.' (M.C. Flannery., 2012) This is an important point to reflect upon in the educational setting and the nature of an examination driven curricula as a tool, because of the nature of teaching and learning. It is particularly important to me as I had invested in biology as a career choice, but then diversified into art and graphics. Although nature, our environment and biology are at the heart of my creativity and personal statement.

The nature of a small data sample size makes it difficult to compare against national trends. Therefore, an interview has been used as part of my methodology to examine the potential barriers to reintroducing drawing skills back into the curricula, standardised testing and feedback. Adopting this methodology means that I can evaluate what Biologists are doing, with a view to checking constantly that what they are doing is really working. This enables me to subjectively ask whether they are really influencing their situation or whether they are fooling themselves by repeating

rituals which are grounded in a way of working, which has no empirical evidence at its foundations. With the use of this data I am therefore able to reflect upon their systematic approach as they work through their actions and pose an argument that illustration skills should be part of science. Also, delivered through organisations and educational establishments delivering Science/biology and not solely delivered through Art College.

## Data collection rationale

Data collection in the project context is hinged on qualitative data due to the nature of the sample size. The use of numerical or quantitative data is restricted due to the small sample size. Therefore an interview has been used to address the balance between quantitative and qualitative data.

## Examples of qualitative data methods include:

### Data collection method

Partner  
Survey question bank: Likert  
items and scale

### Justification for method

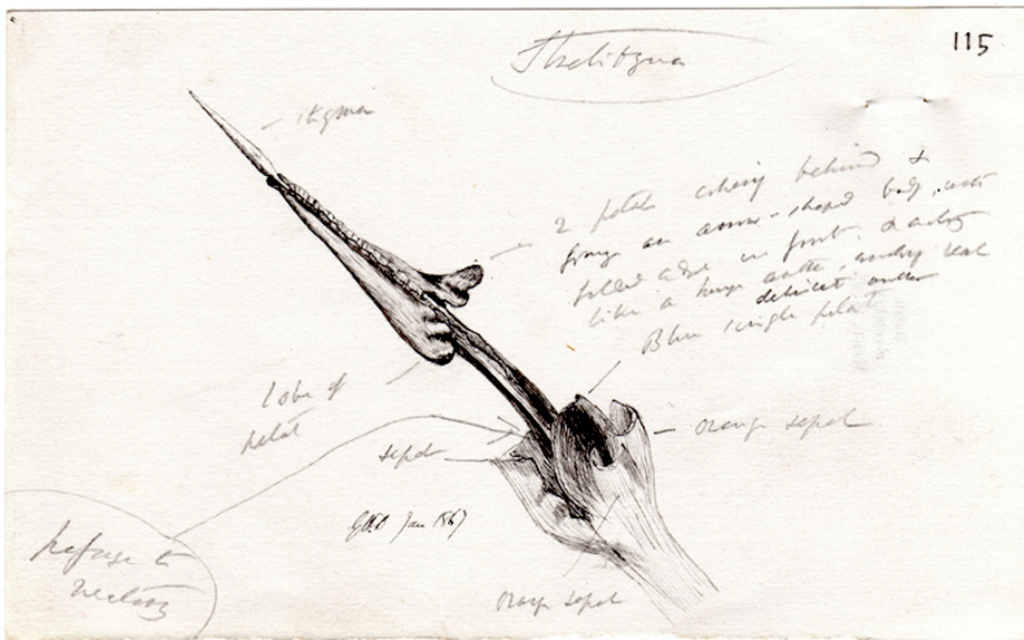
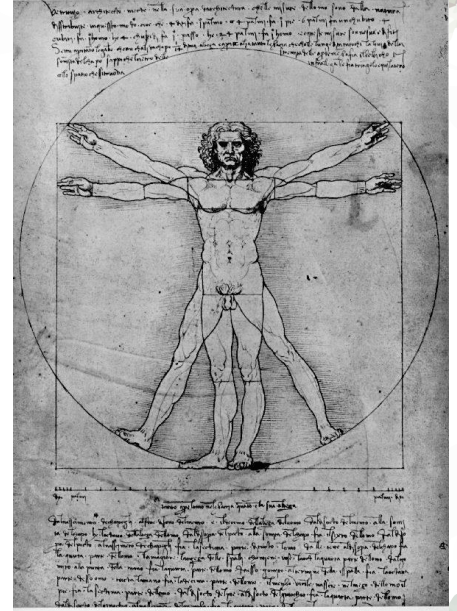
- Familiarity of the survey type for participants, as almost everyone would recognise this type of questionnaire.
- The Likert items and scale offer a broad measure of attitudes and values measurement, which offers a simplistic gauge of specific opinions.
- The questionnaire versatility of two parts offers the 'stem' statement and the 'response' scale.
- The scale offers a neutral point, thus avoiding a forced response.
- The Likert scale offers a 'summated' scale, therefore measuring the respondents' overall score on the attitude or the value.
- The scale allows for greater accuracy in coverage of the differing facets of complex and multidimensional attitudes. Or values such as social-psychological core elements of authoritarianism, therefore diluting the impact of random error.

## Critical analysis:

How do plants take selfies:

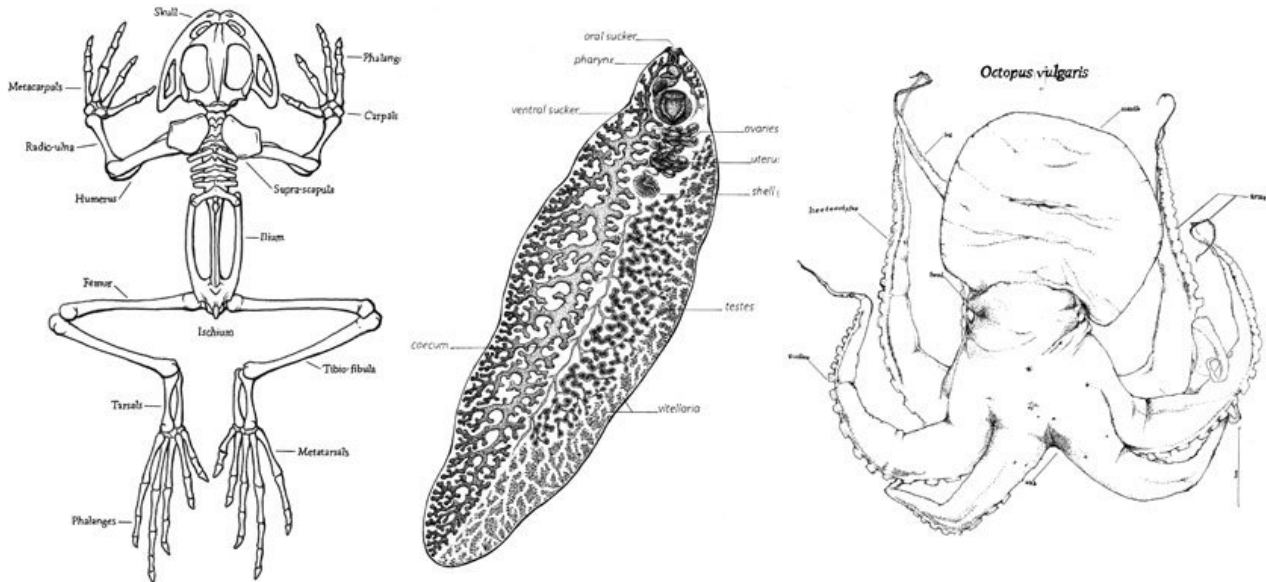
When did biologists stop becoming artists?

When we think of scientific illustrations we are taken back to a time of Leonardo da Vinci, that archetypal Renaissance man a century ago, and more recently Darwins sketches in Origin of the species. In which he captured the intrinsic differences in finches and Galapagos tortoises. Both relied on hand drawn illustrations, both at a point in time where 'the ability to draw was a necessity. No cameras, printers, copiers, or online images - if you wanted to convey information visually, you had to do it yourself.' (J. Landin., 2015). At a time when science was developing the differences between art and science were worlds apart. 'Apart from the unique case of Leonardo da Vinci, the scientific and the artistic eye cast on living things have rarely resided in the same head, as the analytical, dissecting interest of the scientist has been considered a contrast to the holistic, spiritual view of the artist.' (M., Gross 2013). We now take for granted the skills of those early pioneers of science. We see examples in homes all over the country artworks depicting scientific specimens ranging from 18th century anatomical diagrams of the body to watercolours of exotic birds of paradise. From those first illustrations 'evolutionary biologists are now asking themselves just what art is for. And some are concluding that it is not merely an accidental manifestation of human intelligence, but a specific, evolved capacity with a clearly defined purpose.' (Science and technology., 1999.)



Scientific Illustration taken from Darwins Origin of the species.

'PRODUCT VERSUS PROCESS, In the 1920s and 1930s, as drawing was eradicated from public school programs, people cheered. No more long, drawn-out (sorry for the pun) lessons on form, accuracy and detail. The product could be prepared in advance, and students would not waste class time practicing outdated drawing techniques.' (J., Landin., 2015)



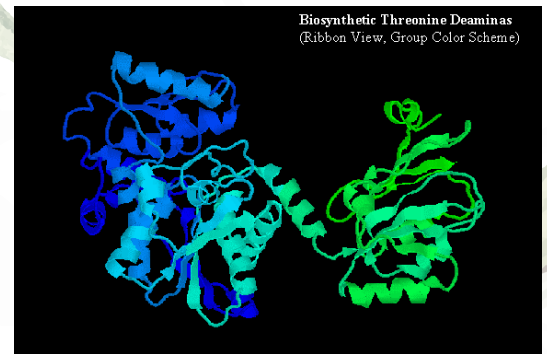
At this point did scientists start to lose out on key observation skills developed through illustration and was the art of patience in studying in detail lost. Was it at this point art and science became two distinct disciplines. Scientists study the new skills needed to answer questions about nature through empirical evidence; and artists communicate through annotated illustration on behalf of scientists. Therefore did these once one and the same disciplines of study become two separate academic fields. 'Most examples of biology and art influencing each other describe what amounts to little more than a one-way street, with artists being inspired by living organisms, by biological research, or by the results of such research. It's more difficult to find examples of scientists being assisted by artists beyond producing illustrations.' (M., C., Flannery., 2012).

Scientists are now getting in on the act of the artist 'over the past few years, they have discovered ways in which the tricks employed by artists exploit these divisions of labour to create illusions of reality. That provides some answers to the question "how?". Neither is the question "why?" being ignored.' (Science and technology ., 1999) but are scientists missing out through the drawing skills required by artists, are scientists losing out on the knowledge gleamed through the observational skills honed by da Vinci and Darwin. Have scientists sold themselves short.

There seems to be a growing trend of biologists turning back the hands of time. Is it that the beauty of science is getting into the soul of scientist once more. The world of science has moved on at considerable pace, in part due to the fast pace of technology.

What would Darwin think of computer modelling. Scientists are now able to make and share around the world at the push of a button 3D models of DNA and the nano structure of protein molecules. Biology students can now study interactive 3D computer models at the touch of a button. For example RASMOL allows a 3D image to be manipulated and studied on any I.T. device.

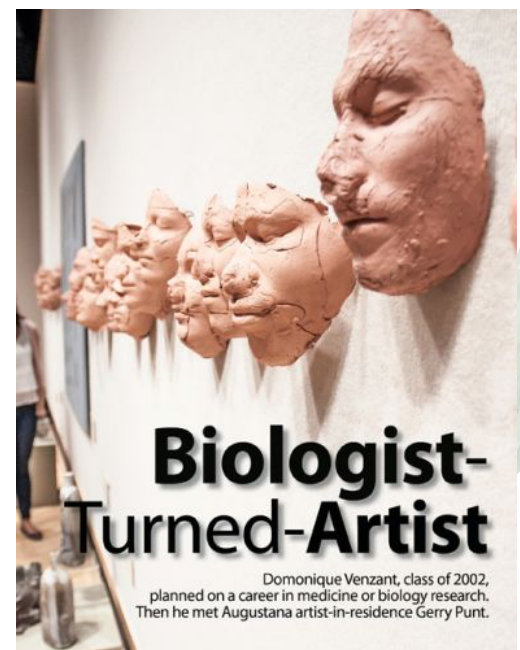
Biology teachers are able to bring into the classroom a world of scientific images and models.



Is there a place for artistic illustration in the classroom or should time be spent on understanding processes and analysing empirical data. We have to almost ask is artistic illustration really necessary when developing knowledge and understanding or is it more scientific than 'Art is a uniquely human activity associated fundamentally with symbolic and abstract cognition. Its practice in human societies throughout the world, coupled with seeming non-functionality, has led to three major brain theories of art.' (D.,W.,Zaidel., 2010) It makes us think SCIENCE is generally the farthest thing from people's minds when they take in the beauty of a Van Gogh or a Monet. And by the same token, artists rarely consult scientists before painting a canvas. But it was not always so' (Science and technology., 1999)

There are biologists whom are leading the movement back such as ' Biologist Turned Artist Domonique Venzant is proof that even the best laid plans are no match for the power of a heart awoken.

In 2002, Venzant was a senior biology major intent on pursuing a career in medicine or biology field research. On the final stretch of his senior year, he took an elective ceramics class from Gerry Punt, assistant professor of art and Augustana's Artist in Residence, during his last semester. ' (G., Punt., 2002) Not the archetypal scientific illustration based on observation, but like Darwin an evolution in itself.

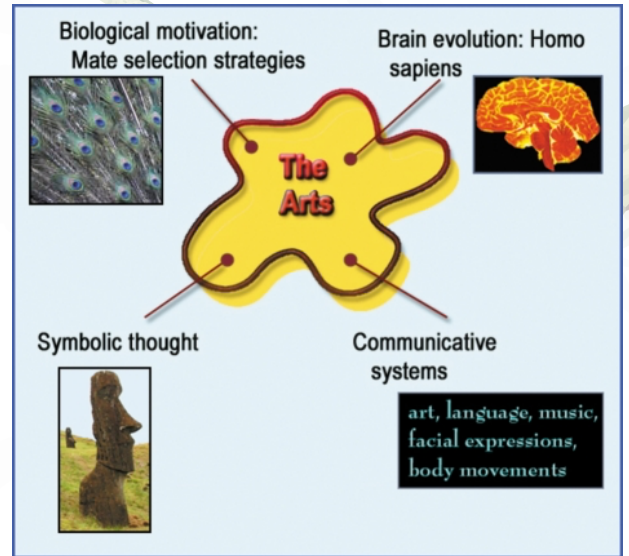


"He's really brilliant – he's got this great way of connecting his artwork with the history of being human and with time and space." (G., Punt., 2002)



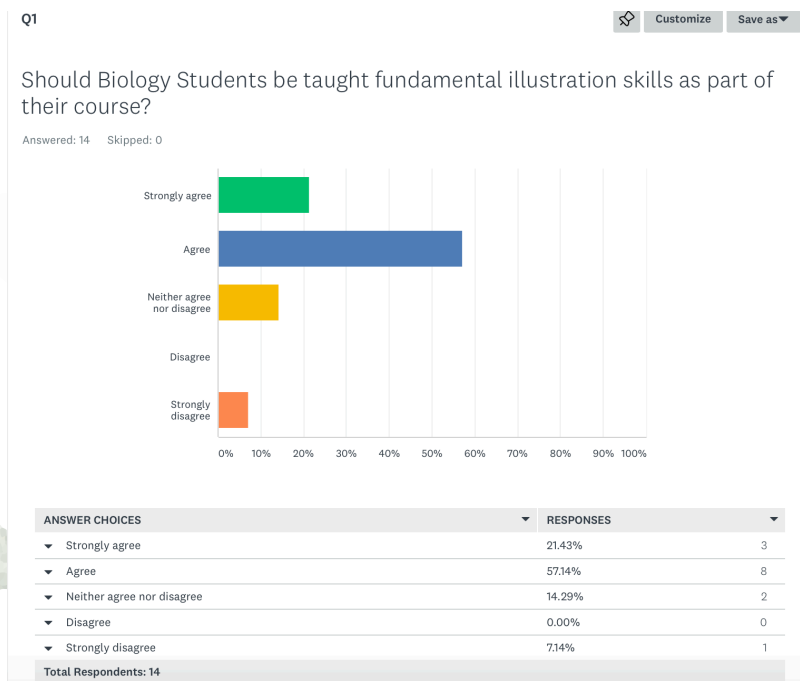
We need to ask the question "How do plants take selfies?"

Do we create a computer 3D model and ask a software engineer; or do we ask a photographer to capture an instant image in time, or do we ask an artist to create an artistic impression, or do we go further back in time and as a renaissance artist to capture its beauty in oil. Or do we regift biology students with drawing skills so that they can spend time immersing themselves in the reason that biologists started to study biology in the first place, capturing the natural world around them in a illustrative sketch. Or is it best left to the artist.

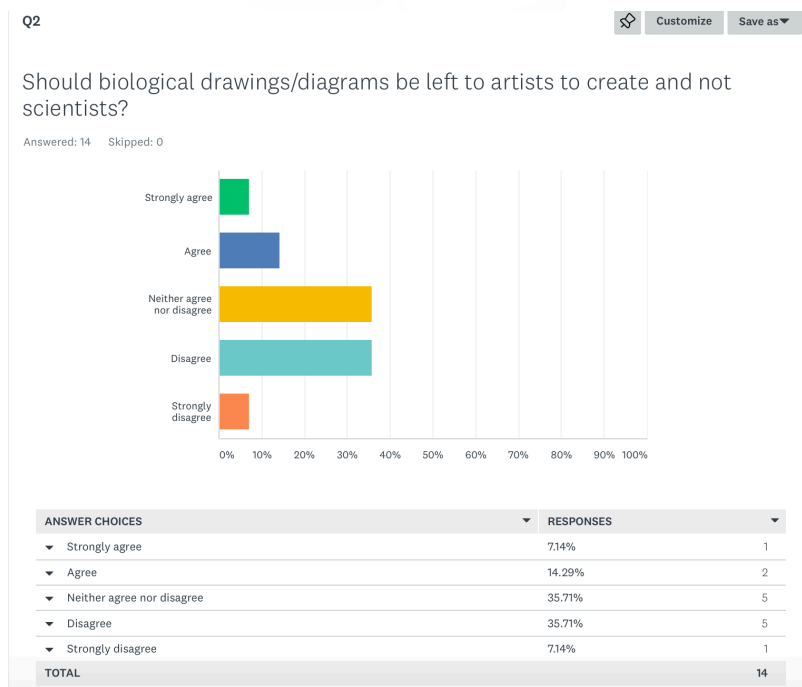


## Key issues

As part of my research and preposition of where my work sits in the context of a key issue. I am looking at the distinction between the publics perception of scientific illustrations being created by artist. Versus drawing skills being reintroduced as a key skill in educational establishments allowing biological illustrations to be completed by biologists themselves. My key questions analyse where the context of my work lays and questions wether there is a need for my work, which is set within landscape of nature, history, geography inspired by the landscape seen by biologists. I have asked the general public key questions set within the methodology for collecting data, through the use of following Likert scale survey and interview of a biology teacher to attain a clear perspective of the context in which my work sits:

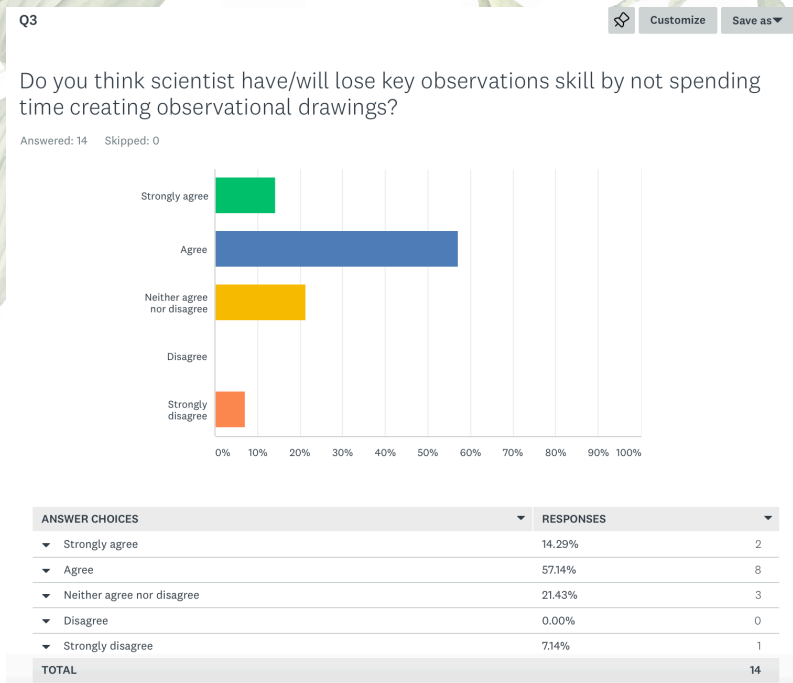


Question 1 analysis: We can see through analysis of this key question that the majority of participants over 78% show that illustration skills should be taught as part of biology course this is reinforced by 'Rediscovering the forgotten benefits go drawing' (J., Landin., 2015). At present drawing skills are not part of the biology curriculum and have not been so within science from approximately the 1920-30's. Even though there are computer aided models, artistic illustrations seems to be a place for drawing skills, or is this a reflection of the pace of modern biology and the pressures placed on the time required to study a knowledge based subject.

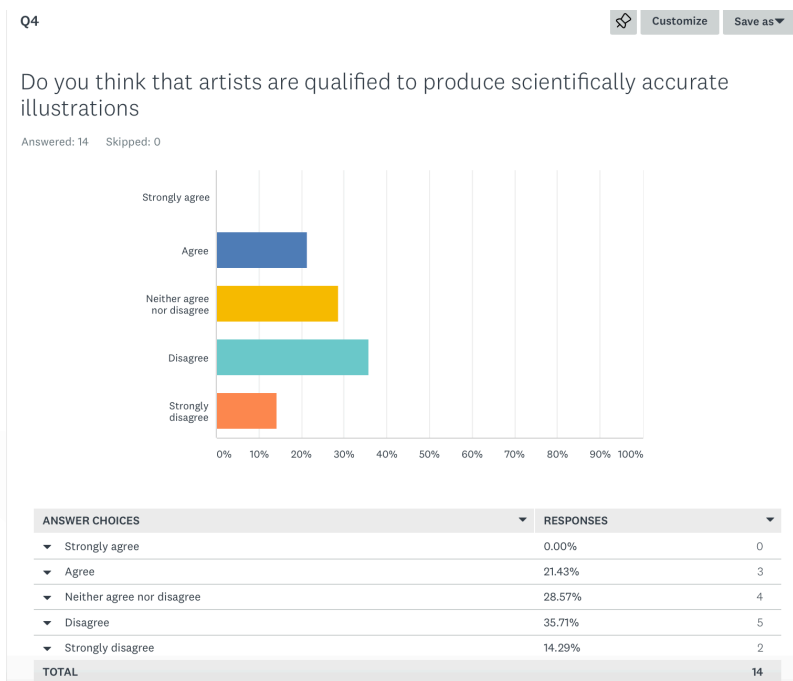


Question 2 analysis: The participants responses to Question 2 show that there is a portion for artists to be involved in scientific illustrations with 35% disagreeing and 35% neither agreeing nor disagreeing. Does this reflect the current trend for scientific illustration being seen as art and not science?

D.W. Zaidel writes 'The enormous variety of art created in human societies throughout the world expresses a multitude of ideas, experiences, cultural concepts, creativity and social values. The arts – paintings, sculpture, theatre, poetry, film, music and dance to name but a few – form a communication system between artist and viewer, represented in a manner not afforded by language alone. Whereas nearly everyone can use language, only a few can create art compositions with qualities that elicit reactions of pleasure and appreciation for subsequent centuries and millennia.' This captures the idea that as a society we see scientific illustration as a way of capturing the beauty of nature through science and therefore appreciate the aesthetics that only artists can capture.



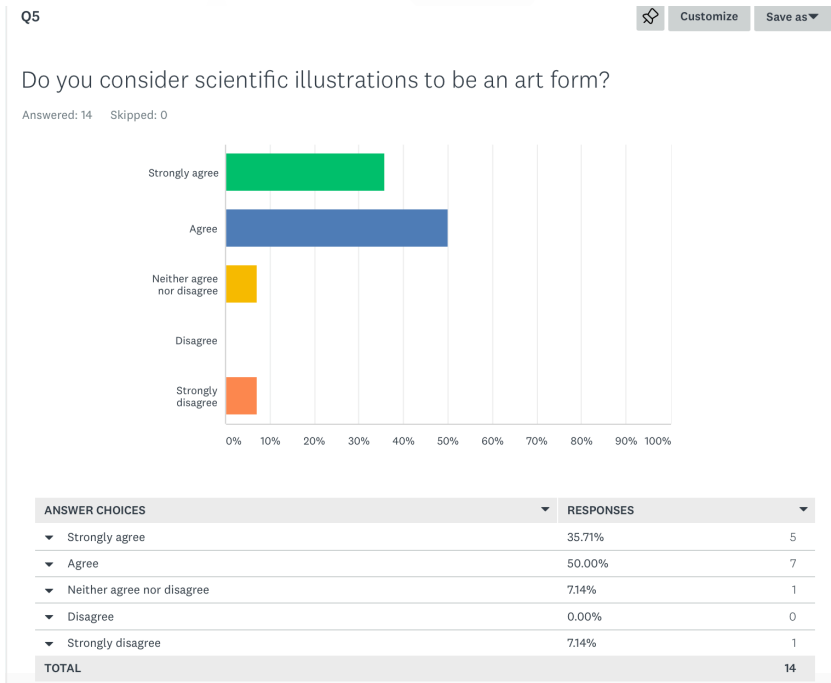
**Question 3 analysis:** Question 3 shows that over 71% of participants strongly agree and agree that scientists will lose key observation skills by not spending time creating observational drawings. With 21% neither agreeing nor disagreeing. Only 7% strongly disagreeing. One could say that this is evidence to reinforce where art and biology meet. M Gross discusses that 'Nature inspires art, but conversely, art can also aid biological understanding, which, in turn, can help the appreciation and conservation of art works. Michael Gross investigates examples of symbiosis across the 'two cultures' divide.' (M., Gross., 2013)



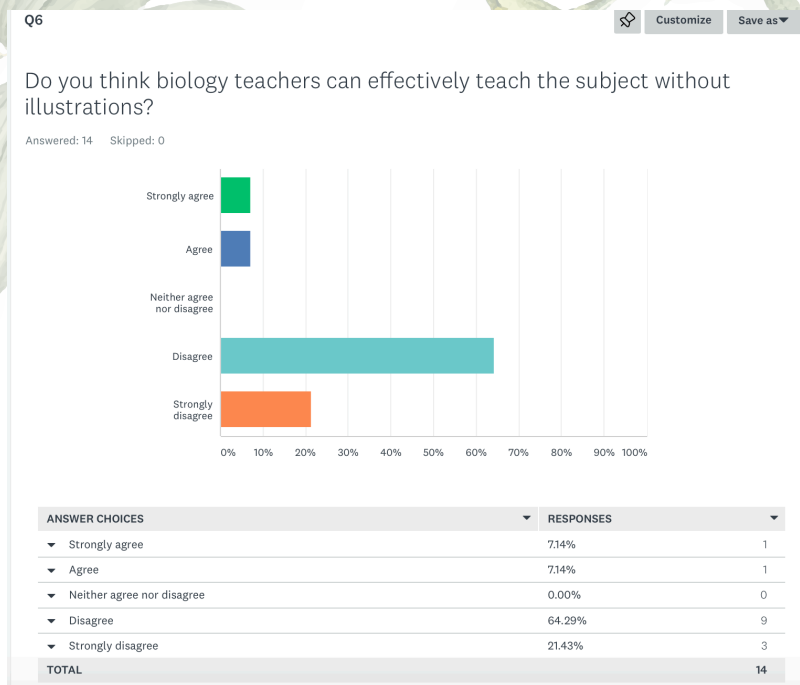
**Question 4 analysis:** Participants have responded to this question 'Do you think artists are qualified to produce scientifically accurate illustrations with a mixed response? With the highest percentile 35% disagreeing. Perhaps Domonique Venzant, biologist turned artist is evidence otherwise,

“He currently serves as a full-time instructor of ceramics and sculpture at the Minneapolis Community and Technical College. An exhibition of his work, entitled “Sine Qua Non” was held at Augustana’s Eide/Dalrymple Gallery ”

This question reflects the dichotomy between what scientific observation skills and biological subject knowledge verse artistic subject knowledge and skills diverge.



Question 5 analysis: the upper percentile with 85.71% of participants considering scientific illustrations to be an art form with artists taking direct inspiration from biology. Micheal Gross discusses the work of Mark Quinn saying ‘One of the modern artists seeking inspiration in biology is Mark Quinn, who created a portrait of geneticist John Sulston using bacteria transformed with Sulston’s own DNA. Since then, he has produced more work inspired by biology,’ Again art inspired by biology and biology seen as an form of art.



**Analysis of question 6:** The question set asking if biology teachers can effectively teach the subject without illustrations shows 85% of participants disagree and strongly disagree that teachers need illustration. The illustrations used by biology teacher are drawn by artists and not biologists, therefore biology teacher are complying the skills of artists to communicate biological processes and key subject knowledge. If illustrations are fundamental to teaching, should drawing skills be part of the biology curriculum. J.Landin states that:

‘Drawing is merely making lines and dots on paper. If you can write your name, you can draw. But we all take shortcuts when we see; often our brains fool us, and we skip over most visual details. Since some species of dragonfly can only be distinguished from others by the vein patterns in their wings, skipping details is not an option.’


## Biology teacher interview:

Currently teaching Science and Mathematics, specialising in Biology at Stronsay Junior High School, Orkney.

Interview with a biology teacher discussing the context of where my work sits alongside the key issues raised through key questions. Should drawing skills be reintroduced into the curricula as a way of developing observational skills.

### *Shortened response:*

**Question 1:** Should biology students be taught fundamental illustration skills as part of their course?



"I feel that it would be of great benefit in some circumstances, maybe as part of field study skills to be able to develop drawing skills as a vehicle for broadening these observational skills. We seem to be all about instant effect, why draw when you can cut and paste! The main issue is that of time in an already heavy packed curriculum"

**Question 2: Should biological drawings/diagrams be left to artists to create and not scientists?**

" It depends on the end goal, it is a question of whether drawing a diagram is for a tool to communicate a concept, idea or is the diagram part of developing knowledge and understanding. If it is part of study and developing understanding, it is worth spending time studying the subject matter. As biologists we want to share the beautiful world around us and share its complexity in order to develop our understanding. But we are not given any formal training anymore so what we see and what we produce are often very different."

**Question 3: Do you think scientists have/will lose key observational skills by not spending time creating observational drawings?**

" yes, it is not easy to simply use a web cam or camera to capture an image. I often feel we miss out"

**Question 4: Do you think that artists are qualified to produce scientifically accurate illustrations?**

"yes, I feel that they are reproducing and this can be achieved without an intricate depth of knowledge about how and why."

**Question 5: Do you consider illustrations to be an art form?**

"Defiantly, I have lots of biological prints on my walls, I think that artists are able to capture the beauty around us. I really enjoy the close relationship between art and the science study. "

**Question 6: Do you think biology teachers can effectively teach the subject without illustrations?**

" I use illustrations, diagrams, models, and computer models. We all learn differently. Illustrations help simplify complex processes such as transport of materials in and out of cells or molecular chemical reactions. Explanations without the use of illustrations become complex and can be oversimplified with illustration." For some pupils a simplified illustration can unlock a key idea.

## Conclusion

The aim of this research was to examine the exploration of the collaboration between artists and biologists and the resulting current trends in data representation. The current trend for artists to produce biological illustrations for biologists to use in their work. Raised the question of whether drawing abilities should be taught as part of the skills needed by biologists alongside other set expertise such as observational skills. There seems to be a growing movement by some biologists to return to the practise of drawing illustrations in order to develop observational skills.

Through my research I have examined six key questions to reflect the context of where my work sits within these current trends. I have always been inspired by biology, nature and the complex interdependence between science, nature, history and geography. I wanted to find out whether the context in which I operate fits into the public's perception of art and science.

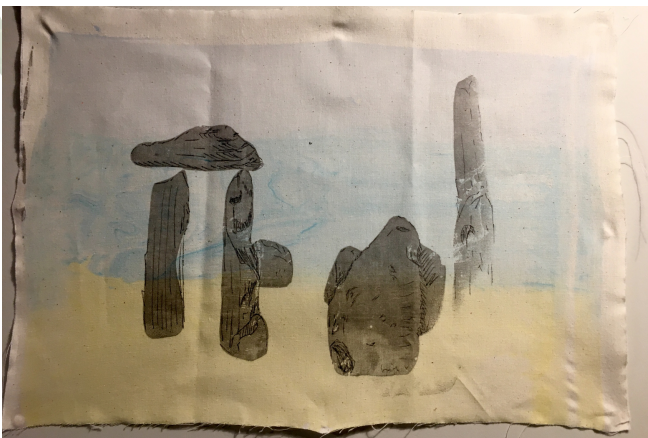
In conclusion my results have shown that there is a strong correlation between art and science, that they have in effect evolved together; they were once one and the same. Studied together until the 1930's. There seems to be a drive to return in part to that time. Not for the sake of art but for the sake of observation. The analysis of my key questions and interview reflect this. It is often difficult to differentiate art from biology and biology from art. Art is a way of communicating the world around us and biology is a way of explaining how it works and why it is, the way it is. The complex way in which both art and science, in particularly biology have evolved together is reflected in the desire we have to display scientific illustrations in our homes and public places. We display scientific illustrations not for the use as a scientific tool but as an aesthetically pleasing piece of art.

Therefore I feel that the context in which my work sits is relevant and has a place. We seem to view art and scientific illustrations as one and the same. Science and art separate us from other animals, it is part of what makes us human.

## How this investigation has informed my creative practice

Through this investigation I have had opportunity to examine what has influenced my creative practice and the context in which it sits. The research has allowed me to reflect upon my first experiences of looking down a microscope at a new and exciting landscape. Allowing me to see the beauty within nature and the evolution of the history between art and science. In reflection my work has always been influenced and set within the environment. I am still drawn to the early sketches by Darwin and the detailed botanical water colours. They lay at the heart of my wider work. Even though I have an army of technology in which I can embed my work; nothing inspires me more than being in nature and immersed within the environment, examining it first hand. The wind in my hair, my feet in the sand and the sounds of nature around me. That is where I am at home, that is where my work flows from.

### Example of my creative practice



**CONTEXTUAL SCREEN PRINT**



**CONTEXTUAL PHOTOGRAPHY**



**CONTEXTUAL PHOTOGRAPHY**





## References

<https://blogs.scientificamerican.com/symbiartic/rediscovering-the-forgotten-benefits-of-drawing/>

[https://www.cell.com/current-biology/pdf/S0960-9822\(13\)00010-9.pdf](https://www.cell.com/current-biology/pdf/S0960-9822(13)00010-9.pdf)

<http://www.augie.edu/biologist-turned-artist>

<http://abt.ucpress.edu/content/74/3/194>

<https://www.economist.com/science-and-technology/1999/04/01/the-biology-of-art>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2815940/>

<http://theappendix.net/posts/2014/02/darwins-children-drew-vegetable-battles-on-the-origin-of-species>

<http://www.openrasmol.org>

