



Portfolio

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Ancient Light: Rematerialising The Astronomical Image

Introductory Note

A portfolio of artistic practice to accompany Ancient Light: Rematerialising The Astronomical Image PhD thesis'

Artistic practice is crucial to the development of this practice-based PhD. This portfolio comprises of several artworks that have informed and surfaced from my research. The individual sections of the portfolio correlate to individual chapters within the thesis and are cross-referenced accordingly.

This portfolio includes artworks that demonstrate an original contribution to knowledge, as methods that are used build upon existing processes.

This research proposes an embodied approach to astronomical imaging. In addition to this, the research demonstrates an approach to analogue photographic processes which utilises methods that minimise damage to the environment. The practice set out in the portfolio led to new ways of thinking, as I responded to the experiences of working in several dark sky environments. In addition to this, my perception of photographic materiality altered as I relinquished control and allowed non-human entities to interact with the photographic surface.

As a working class self-funded student, the works produced in this portfolio are made to the best of my ability with limited finances. Financial constraints have often affected the size at which my prints can be made, and how prints might be framed.

These are all finished artworks

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Chapter 1: Encountering Ancient Light

Ancient Light

Ancient Light comprises a series of long exposure photographs of the night sky. To produce these images, I used Ilford Delta 3200 (high-ISO) film during several residencies in dark sky spaces and at observatories. This film was chosen due to its high sensitivity, allowing it to work well in low light conditions. I chose exposure times of between thirty seconds and ten minutes to take photographs of the night sky.

An exposure of 30 seconds is the longest exposure possible to record the stars as pin pricks of light without an equatorial mount. After thirty seconds, the stars appear as a streak or trail in the sky. To choose the optimum exposure time, I tried out exposures at 10 seconds and increased the exposure incrementally.

I adopted this technique from Theo Schlichter, a telescope engineer working at UCL Observatory where I had a short residency. Prior to the residency, I had an approach to exposure timing which was more intuitive. Schlichter showed me the benefits of using different timings to determine the best exposure. I chose to print the negatives using Ilford Harman Silver Gelatin Fibre Based Warmtone paper. I chose this paper due to its rich and velvety black and grey tones, which suited the subject of the night sky.

I wanted to print the photographs at 16x20 inches so that the viewer felt immersed in the print. The prints were exposed at a high grade on the enlarger, using long exposures to increase contrast. The prints were then framed using non-reflective glass with black frames and black mounts.

In January 2017, I produced a solo exhibition of the "Ancient Light" series at Blyth Gallery, Imperial College London. An important aspect of the exhibition was to show the physical film negatives on a lightbox, which were held underneath a thin layer of acrylic.

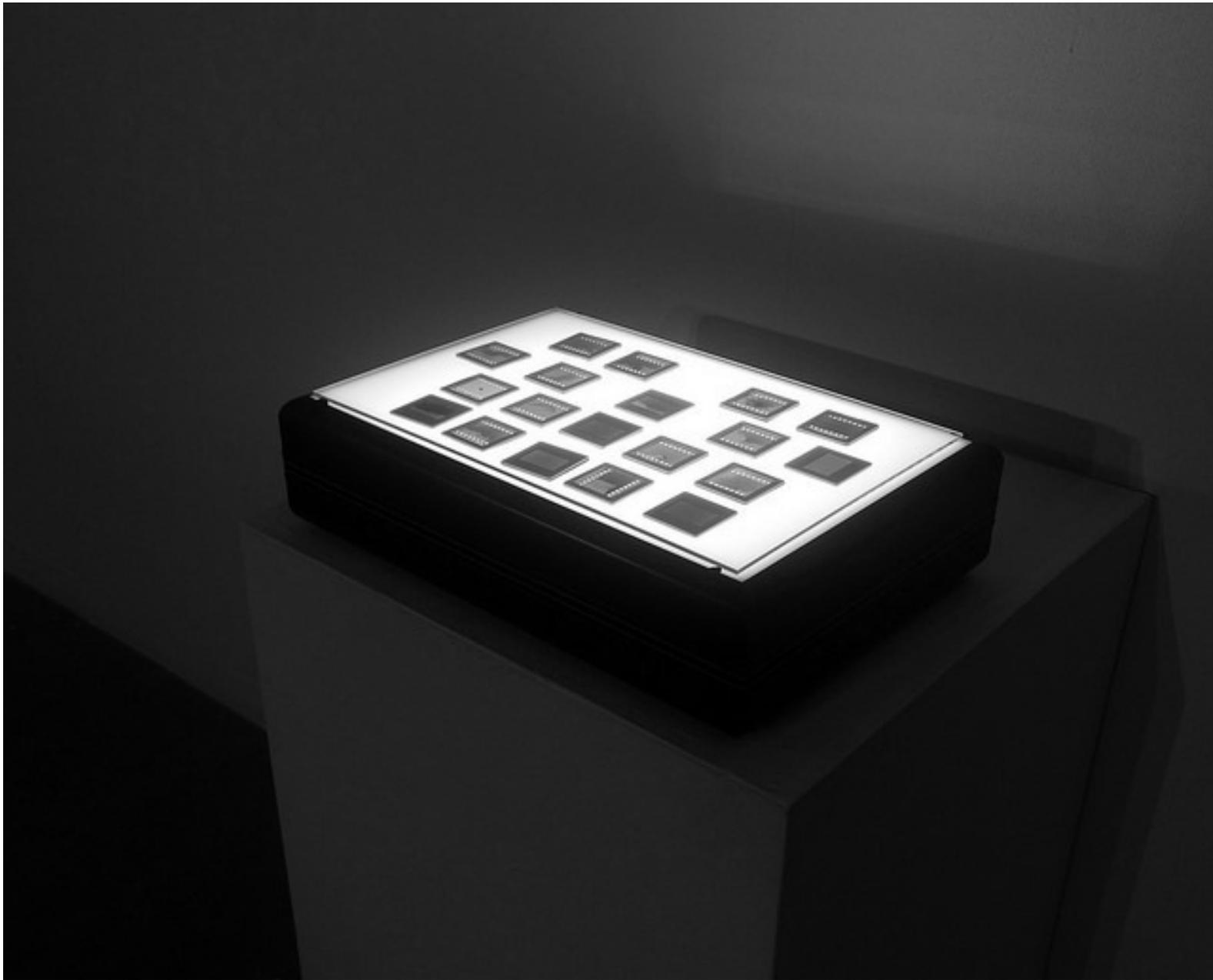
I intended for the viewer to experience the silver gelatin film that had encountered light from the stars. Here, the viewer physically encounters photographic material which has been darkened by stellar photons. The film is directly, materially linked to stars that are thousands, if not millions, of light years away. It was important for the viewer to view the indexical negatives of starlight, so that the viewer can tangibly experience a material object that has been transformed by a distant celestial object. The aim of this decision was to engender a feeling of the cosmic perspective, from a terrestrial standpoint.

Due to my circumstances at the time, all work was produced using the cheapest and most readily available materials. I created two A0 prints from my "Ancient Light" series, produced during another exhibition on the edge of Dartmoor. I used another person's digital camera with a wide-angle lens. The images were printed on Hahnemuhle Photo Rag to emphasize the deep black tones within the images, and to contribute to the materiality and texture of the print.

At the time, I was unable to produce analogue prints of the night sky close to A0 size. However, I was keen for the viewer to become entranced by the vortex structure of the image. As the Earth spins, the Pole Star remains still, whilst all other stars seem to move in a spiral formation.



Ancient Light, Grizedale Forest, UK and Brow Head, Ireland, Fibre-Based Silver Gelatin Print, 2021
Installation shot at *Seeing Stars* Stanley & Audrey Burton Gallery, University of Leeds, 2022
16x20" print



Ancient Light, 35mm Silver Gelatin Negatives, Installation shot at Ancient Light, Blyth Gallery, Imperial College London, 2017.



Installation shot, *Ancient Light*, Blyth Gallery, Imperial College London, 2017.



Ancient Light, Atina, Italy, Silver Gelatin Photograph, 2018 16x20" print



Ancient Light, Atina, Italy, Silver Gelatin Photograph, 2018 16x20" print



Ancient Light, Atina, Italy, Silver Gelatin Photograph, 2018 16x20" print



Ancient Light, Atina, Italy, Silver Gelatin Photograph, 2018 16x20" print



Ancient Light, Atina, Italy, Silver Gelatin Photograph, 2017 16x20" print



Ancient Light, Atina, Italy, Silver Gelatin Photograph, 2017 16x20" print



Ancient Light, Cambridge, UK, Silver Gelatin Photograph, 2017 16x20" print



Ancient Light, Cambridge, UK, Silver Gelatin Photograph, 2017 16x20" print



Ancient Light, Seltún Geothermal Area, Iceland, Silver Gelatin Photograph, 2018 16x20" print



Ancient Light, Vik I Myrdal, Iceland, Silver Gelatin Photograph, 2018 16x20" print



Ancient Light, St Just, Cornwall, UK, Silver Gelatin Photograph, 2017 16x20" print



Ancient Light, St Just, Cornwall, UK, Silver Gelatin Photograph, 2017 16x20" print



Ancient Light, Grizedale, UK, Silver Gelatin Photograph, 2017 16x20" print



Ancient Light, Grizedale, UK, Silver Gelatin Photograph, 2017 16x20" print



Ancient Light, Margate, UK, Silver Gelatin Photograph, 2018 16x20" print



Ancient Light, Margate, UK, Silver Gelatin Photograph, 2018 16x20" print



Ancient Light, Andalucia, Spain, Silver Gelatin Photograph, 2019 16x20" print



Ancient Light, Andalucia, Spain, Silver Gelatin Photograph, 2019 16x20" print



Ancient Light, Brow Head, Ireland, Silver Gelatin Photograph, 2019 16x20" print



Ancient Light, Brow Head, Ireland, Silver Gelatin Photograph, 2019 16x20" print



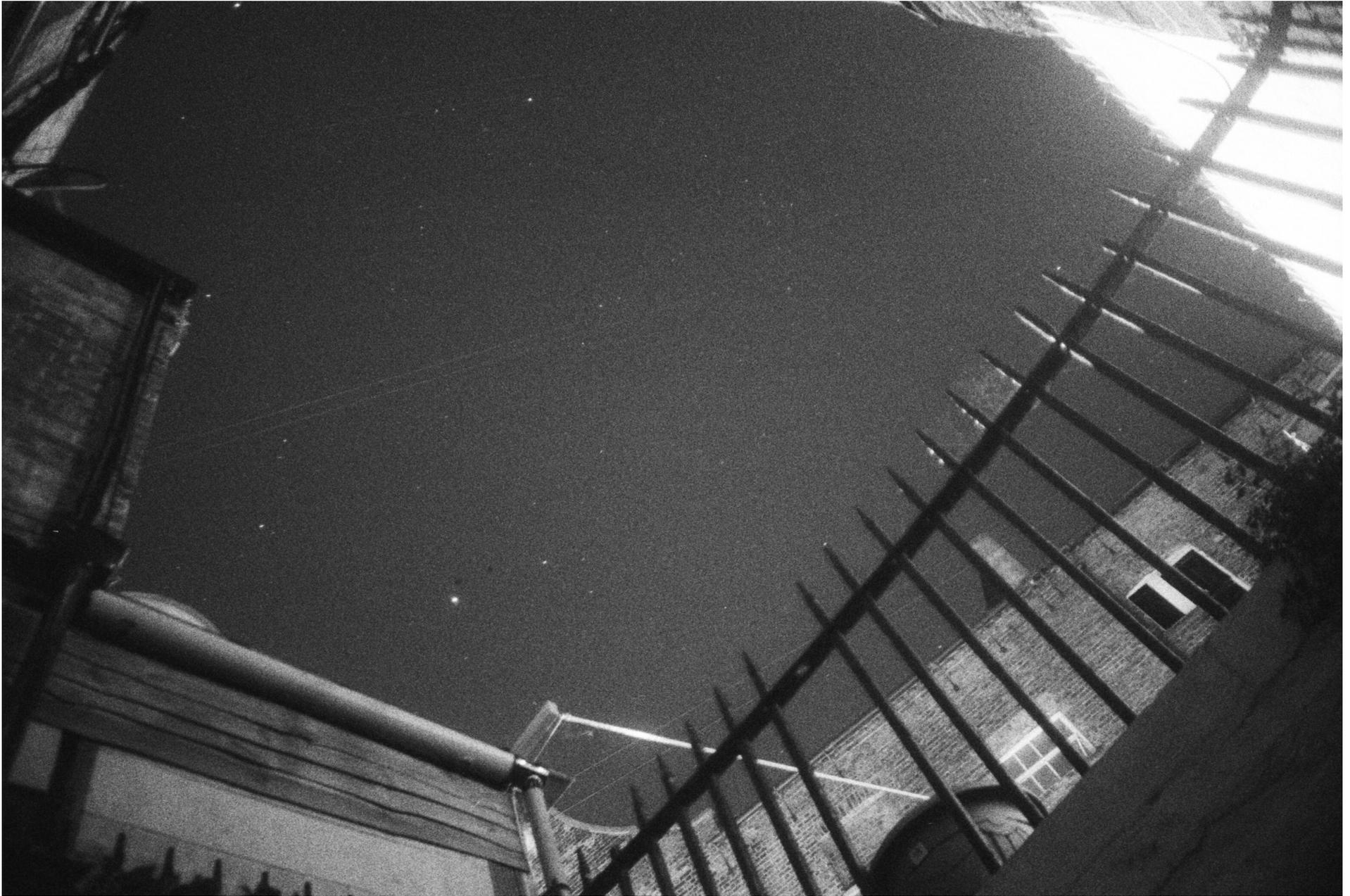
Ancient Light, Kilpisjärvi, Finland, Silver Gelatin Photograph, 2019 16x20" print



Ancient Light, Kilpisjärvi, Finland, Silver Gelatin Photograph, 2019 16x20" print



Ancient Light (Lockdown), Margate, UK, Silver Gelatin Photograph, 2020 16x20" print



Ancient Light (Lockdown), Margate, UK, Silver Gelatin Photograph, 2020 16x20" print



Comet Neowise, Ramsgate, UK, Silver Gelatin Photograph, 2020 16x20" print



Ancient Light, Ramsgate, UK, Silver Gelatin Photograph, 2020 16x20" print



Ancient Light, Ramsgate, UK, Silver Gelatin Photograph, 2020 16x20" print



Ancient Light, Ramsgate, UK, Silver Gelatin Photograph, 2020 16x20" print

Ancient Light & The Moving Image

As I stood beneath the night sky producing photographs for the “Ancient Light” series of photographs, I was struck by how much the stars seemed to move across the sky as time elapsed during my exposures. (Of course, while the camera and the stars remain stationary, the Earth is spinning). For Ancient Light, 16mm Film, I was keen to document the perceived movement of stars as they appear to pass by.

Due to unpredictable weather, the film took nine months to produce. I chose Kodak T 500 colour film, as it is one of the highest ISO films produced in 16mm. I chose to use one hundred feet of film, which roughly equates to four thousand frames, lasting roughly two minutes and thirty seconds at twenty four frames per second. Each frame took 30 seconds to expose, and the choice of timing was influenced by my experience with the “Ancient Light” series of photographs.

The work is intended to be projected large in an analogue format within a darkened room to give the viewer an immersive experience, which mimics the feeling of being underneath a night sky full of stars. Simultaneously, the viewer can experience the film passing through a projector, which has an indexical relationship to the light that has encountered the film. For the film to be shown in a positive format, I would need to produce a print of the 16mm film, which I intend to do in future with financial support. I did not want the projector to scratch the negative film, due to the fine detail of the stars and irreplaceability of the film itself. In this film, dust and scratches may have been confused with photographic traces of starlight.

In my 16mm film “Searching For The Moon”, I focused a telescope on the Moon and held my Bolex camera up to the eye piece. I demonstrated the spin of the Earth by allowing the Moon to sail out of the field of view. In parallel with the “Ancient Light” film, I intend for a print of the analogue film to be projected at a large scale.

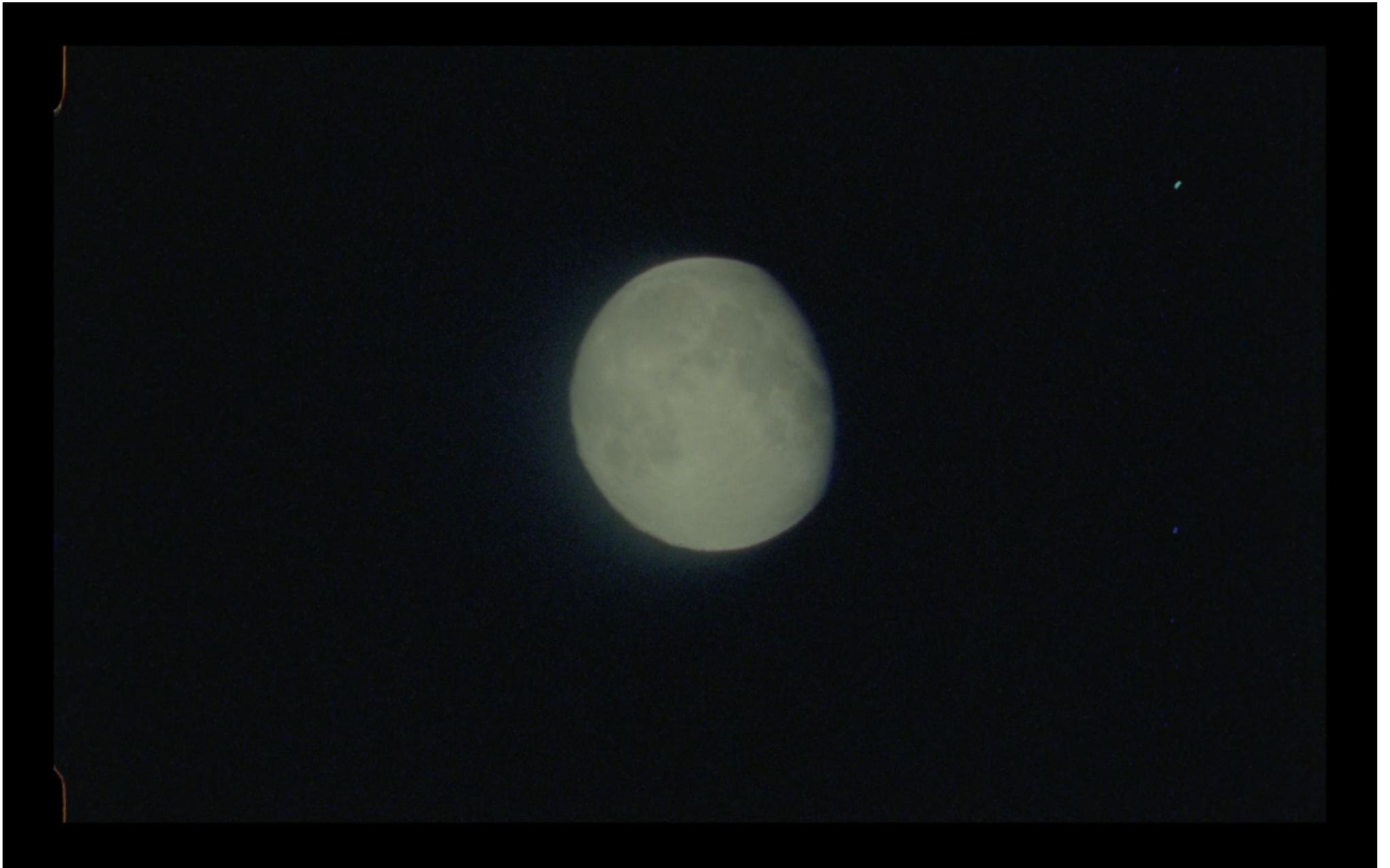
During a film screening in June 2022, I used a 16mm projector to show the original negative film. Unlike the “Ancient Light” film, I was not worried about the film being scratched as the Moon could not be confused with dust and scratches. Furthermore, the presence of these marks contributes to the analogue film screening experience, allowing film that has been touched by moonlight to be physically seen to animate projections within the space.

The “Searching For The Moon” 16mm film was inspired by future iterations, produced using digital cameras attached to telescope eye-pieces. The first film was produced in 2015, using my personal Celestron Astromaster reflector telescope in London during my first year of PhD study. The second film was produced using the Fry Telescope at the UCLO Observatory in 2017, with assistance from Theo Schlichter. The digital videos were shown at MOONs, at the Alyce de Roulet Williamson Gallery at ArtCenter College of Design, Pasadena, California.

The videos were projected at a height of four metres, allowing the viewer to intimately interact with the work. The 2017 iteration of the film was produced on a day with a small amount of cloud cover. The 2017 film is zoomed in due to the magnification of the telescope which cannot be changed easily. Projected at a scale of four metres in height, the experience of viewing the work enables the audience to feel as if they are floating above the Moon due to the cropping of the image. In addition, the presence of the clouds can be misinterpreted as an atmosphere surrounding the Moon.



Ancient Light, Margate, UK, 16mm Film, 2018. Ideal projection height: around 4m



Searching For The Moon, London, UK, 16mm Film, 2017. Ideal projection height: around 4



Searching For The Moon, London, UK, 16mm Film, 2017.
Projected in negative, Ramsgate, 2022. Approx. 1x1.5m projection.



Searching For The Moon, London, UK, 16mm Film, 2017.
Projected in negative, Ramsgate, 2022. Approx. 1x1.5m projection



Ancient Light, Margate, UK, 16mm Film, 2018.
Projected in positive, Ramsgate, 2022. Approx. 1x1.5m projection



Moon Rising II, UCL Observatory with Theo Schlichter, Digital Film, 2018.
MOONS exhibition, Williamson Gallery, Art Center, Pasadena, USA, 2018. Approx projection height: 4m



Moon Rising I, UCL Observatory with Theo Schlichter, Digital Film, 2015
MOONS exhibition, Williamson Gallery, Art Center, Pasadena, USA, 2018 Approx projection height: 4m

Lunar Portraits

Lunar Portraits, 2018-2020 comprises a series of analogue portraits which were exposed by the light of the Moon.

In the first iteration of the project, I worked with members of the London Alternative Photography Collective during a residency at XYZ Books in Lisbon. To minimise light pollution, I entered the grounds of Fundacion Gulbenkian Calouste at 10pm at night, as we waited for the Moon to rise.

Alike many other works featured in this portfolio, I had to wait for ideal astronomical and atmospheric conditions to produce the images. Influenced by earlier work with the "Ancient Light" series of photographs, I used a medium format Mamiya 645 analogue camera and Ilford 3200 film. I used the same exposure and aperture to produce the photographs. I then asked sitters to face the Full Moon, with an instruction to gaze upwards and reflect upon the experience of viewing the Moon for thirty seconds. Unlike Ancient Light, Lunar Portraits includes light from the cosmos, aspects of the landscape and human beings within one image. The moonlight touches the skins' surface and is reflected in to the camera.

In 2019, I had an opportunity to produce a solo exhibition at my Alma Mater, Leeds Art University. Due to budget constraints and the size and shape of the rotunda gallery space, I chose to produce the prints at 10x8 inches. As the Ilford Multigrade Fibre-Based Warmtone silver gelatin paper had rendered deep black tones well within my "Ancient Light" series, I chose to use the same paper for "Lunar Portraits". Digital A1 prints originating from analogue scans were produced to add interest and impact within the exhibition installation.



Lunar Portraits,
Installation shot at Lunar Portraits, Leeds Art University, 2020.
10x8" prints



Lunar Portraits, Installation shot at Lunar Portraits, Leeds Art University, 2020. A0 print + 10x8" prints



Lunar Portraits, Installation shot at Lunar Portraits, Leeds Art University, 2020. 10x8" print



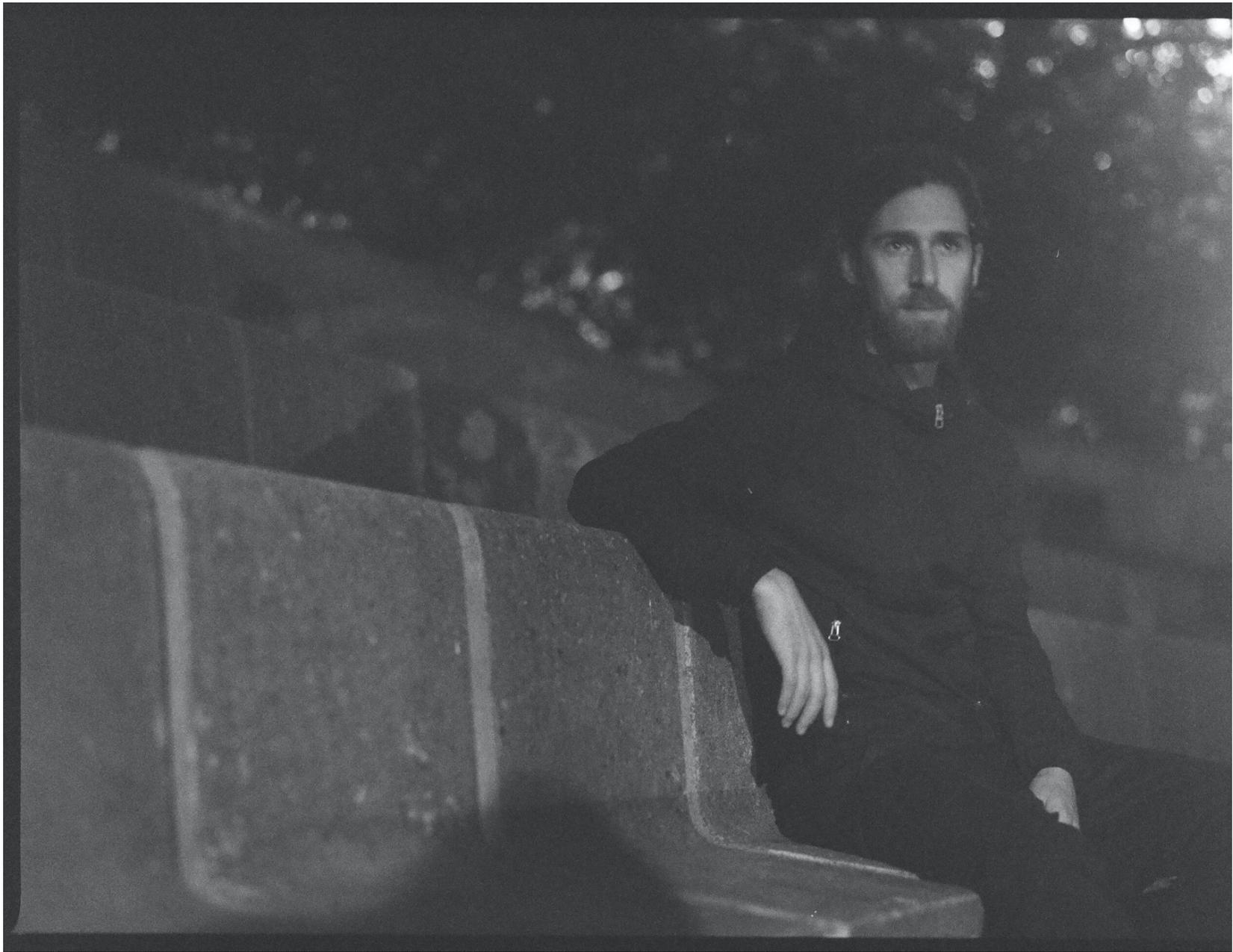
Lunar Portraits, Simone, Lisbon, Silver Gelatin Photograph, 2019. 10x8" print



Lunar Portraits, Hannah, Lisbon, Silver Gelatin Photograph, 2019. 10x8" print



Lunar Portraits, Alessandro, Lisbon, Silver Gelatin Photograph, 2019. 10x8" print



Lunar Portraits, Ivan, Lisbon, Silver Gelatin Photograph, 2019. 10x8" print



Lunar Portraits, Carli & Clair, Margate, Silver Gelatin Photograph, 2020. 10x8" print



Lunar Portraits, Sam, Margate, Silver Gelatin Photograph, 2020. 10x8" print



Lunar Portraits, Annie, Margate, Silver Gelatin Photograph, 2020. 10x8" print



Lunar Portraits, Claire, Margate, Silver Gelatin Photograph, 2020. 10x8" print



Lunar Portraits, Iain, Margate, Silver Gelatin Photograph, 2020. 10x8" print



Lunar Portraits, Claire, Margate, Silver Gelatin Photograph, 2020. 10x8" print



Lunar Portraits, Lulu, Margate, Silver Gelatin Photograph, 2020. 10x8" print

Lunar Portraits- Notes From Participants.

"On average I spend around an hour a day staring down at the light of the screen of my phone. Sitting in the pitch black and staring up at the moon is something I hardly ever do. It was a truly meditative experience. I was sitting there in the middle of the night focusing on the moon trying to sit still for the image. It made me feel very aware of my tiny little presence on the earth and the mighty galaxy that is surrounding us full of stars, moons and planets that are completely unknown for us."

Simone Mudde

"The moon was so bright. We kept looking around, to check there wasn't another artificial light casting such deep indigo shadows from our feet. But it was only the moon, shining up there above the cliff, glittering on the sea, illuminating every wave. It was cold, but we were wrapped up. Standing there, moongazing, as still as we could. Smiling, trying not to giggle at first, but then in the deepening stillness, losing our sense of time. The long exposure a moment that seemed to stretch out sideways, beyond or outside of everyday time, a moment that seemed more in tune with the moon and the stars than the streetlights and cars at the top of the cliff"

Clair Le Couteur and Carli Jefferson

Dear Moon

*Sometimes I wish I could just come to your arms.
But I understand...*

*Far and together
Entangled
Depending one on another*

*I can feel the texture of your matter
The smell of fresh dust, yet to get oxidised.
Constantly shielding us down here.*

*Light and dark
Deity of the waters*

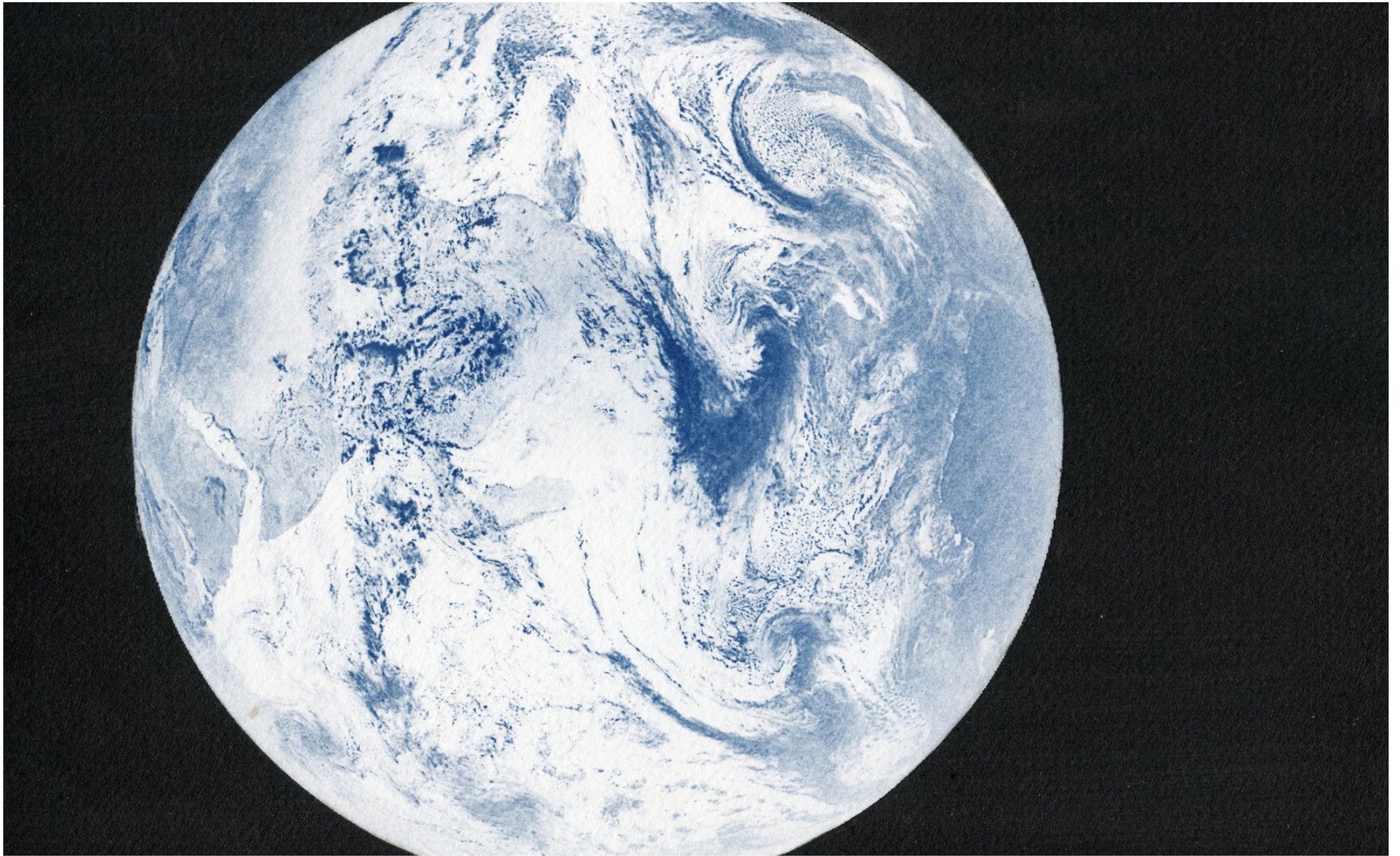
*I can sense your strength pushing and pulling the tides
The tide in me,
The tide of my body, also affected by you, dear Moon.*

Sonata made for the light you reflect on us, that even the blind can see it

*My veins are synchronised on your phases
Sometimes I wonder if you also control my heart*

But I understand Moon."

Diego Valente



Chapter 2: The Delayed Rays Of A Star

First Light

In Elizabeth Kessler's *Picturing The Cosmos* (Kessler, 2012, Introduction) she considers how Hubble astronomical photographs are composites of a range of different images. Several cameras and sensors are used to capture ultraviolet and infrared light, in addition to gamma and X rays. Images are captured in monochrome, often with glitches arising from interactions with cosmic rays. Colour is later added in correlation with the elements that have been detected in the object that has been observed.

In the project *First Light*, I acknowledge the composite nature of astronomical photographs, aiming to remind the viewer of the construction of images produced by institutions such as NASA and the European Space Agency. *First Light* culminated in a solo exhibition at Leeds Art University in 2017.

In *First Light: Pale Blue Dot*, I reproduced a NASA photograph of the Earth using cyanotype on white Somerset Satin paper, which produces a paler cyanotype than Fabriano Accademia and Arches Platine. I then produced a photographic etching plate of a circle, which was exactly registered to the size and shape of the Earth cyanotype. I rubbed Carbon Black etching ink into the plate, which was then transferred onto the cyanotype. The compressed black ink was used to represent the deep void of space, set against the pale blue Earth. Similarly, in *First Light: Full Moon Photogravure* I used contemporary NASA images of the Moon and printed the images using the photopolymer photogravure technique.

With this piece, I was keen to see how historical photographic processes could alter our reading of a contemporary image. In similarity to *Pale Blue Dot*, the compressed carbon black ink produced a textural, dense black that was suited to astronomical imaging.

In *Pillars of Creation (CMYK)*, I worked with Zolt Levay of the Space Science Telescope Institute to reproduce Levay's famous "*Pillars*

of Creation" image using a four colour screenprint technique. At a distance, the print seems to resemble the full colour images that we are used to seeing. However, as you move closer it is possible to see the idiosyncrasies of the diffusion dither matrix within the CMYK screenprinting process. When four colours are combined in a screen print, they form a complex pattern of dots which can create a Moiré pattern. These Moiré patterns are generally undesirable, but I was keen to use this technique to remind the viewer of the layered construction of the image. Additionally, it was important for the viewer to become immersed in the image, whilst viewing image artefacts up close. Therefore, the screen print was produced at A2 size.

In addition to the CMYK image, Zolt Levay supplied me with a monochrome and full colour image so that I could produce a lenticular print. As the viewer walks past the lenticular print, the image morphs from a colour to black and white image. In both instances, the viewer becomes aware that status of the image is disturbed. I chose to create the lenticular print at a scale of one metre squared. At this size, the viewer can fill their field of vision, whilst also detecting the construction of the image. Lenticular prints are created using multiple images which are interlaced. As you change your position in a room, or the angle at which you look at the print, you can see a different image.

In *First Light: Moon Daguerreotype* I used the becquerel daguerreotype process to reproduce a photograph of the Moon taken at Kielder Observatory in 2017. To create a becquerel daguerreotype, a silver-plated copper sheet is exposed to iodine gas without mercury vapours. A positive transparency is then placed on top of the sensitized sheet and exposed to light. The daguerreotype then develops in sunlight for around one hour. Finally, the plate is fixed and washed with distilled water.

With *First Light: Mercury* Daguerreotype, I used contemporary NASA images of Mercury to produce a becquerel daguerreotype, replicating the exact process. As a viewer moves around a daguerreotype, the image seems to appear and disappear. In similarity to *Pillars Of Creation*, I chose to use the illusory aspect of the daguerreotype to hint towards the construction of the image.

The images below show how the individual works can be experienced in a gallery setting. The works were exhibited at *To The Edge Of Time* in KU Leuven, Brussels, Belgium (2021) and at Watermans Gallery, London (2020). In the KU Leuven exhibition space, the lenticular print was exhibited in a black frame, with black mount on a black wall. This allowed for the viewer to further immerse themselves within the work, to minimise distractions from borders.

In *the Photography Index* section in Chapter Two, I discussed my project *Meteorotypes*, a series of prints using meteorite-imbued ink. Meteorites were sourced from a reputable supplier, before being photographed in a studio. At the Royal School of Mines at Imperial College London, I ground the meteorites into a fine dust using a large industrial mill. At the Royal College of Art, I carefully mixed carbon black ink with the meteorite dust. Simultaneously, a photographic etching plate was produced of each meteorite. The ink was then spread onto the plate and put through an etching press. I was interested to create a print with hybrid indexicality. The viewer experiences the indexicality of the photograph itself, in addition to the material connection with the meteorite, which now exists in ink form.

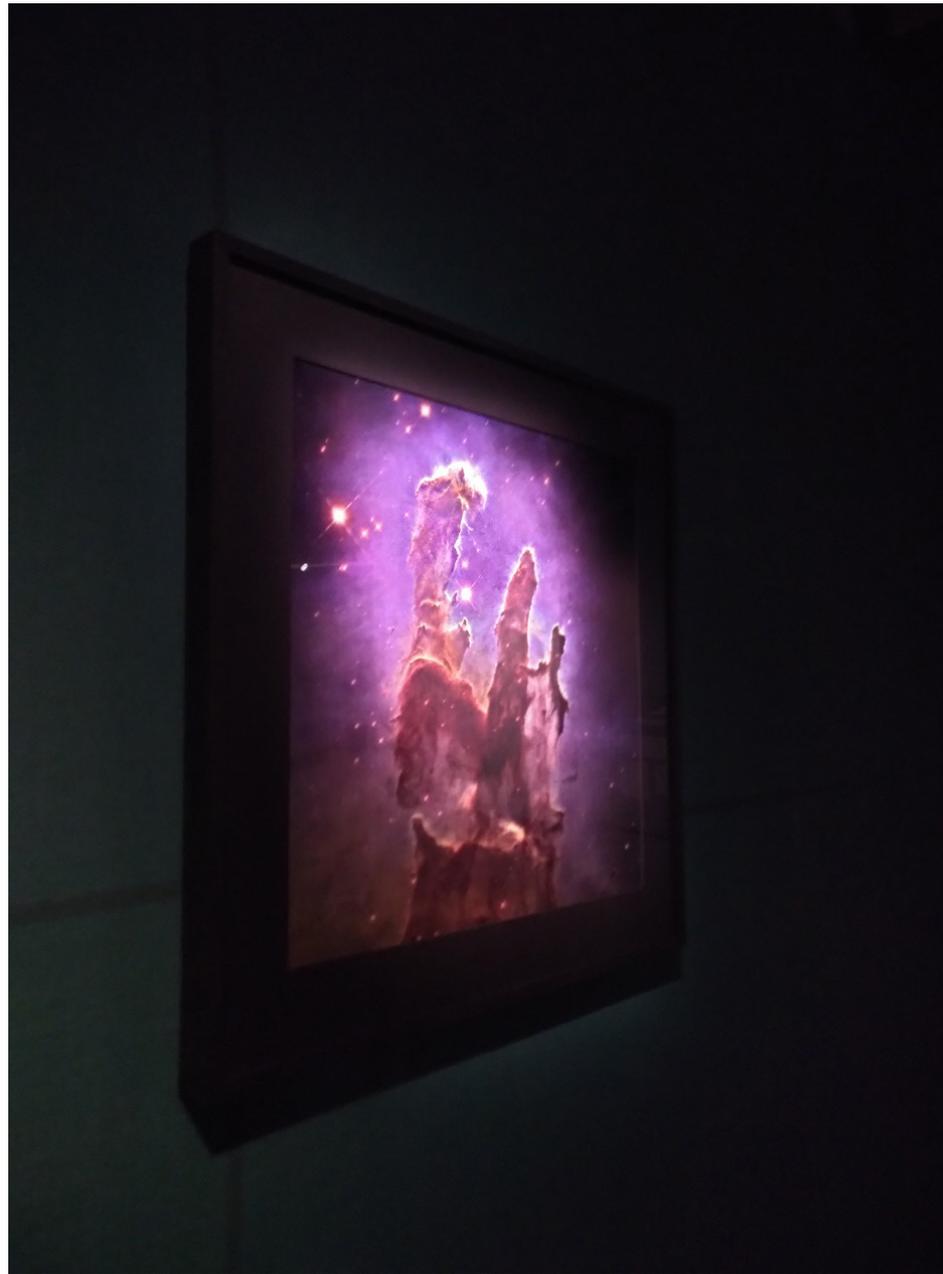
In the *More Than Representation* section of the thesis, I consider the concept of *More Than Representational Photography*, a phrase originating from Rebecca Najdowski's thesis *Inverted Landscapes*.

In this text, Najdowski considers how non-human agents can interact with the photographic surface. Najdowski considers the '*non-human agencies of photographic processes and materials, as well as environmental forces and conditions to produce artwork*' (Najdowski, 2020, 3).

Najdowski produced photograms using silver gelatin paper, using geyser emissions. Steam, water and minerals produce marks as they fall onto the photographic paper. In this portfolio, I present cyanotype prints from my Ancient Light series that have been toned with organic substances such as green tea.

As I am working with organic substances, I cannot fully control how the final print may turn out. In the following section, I will discuss how cyanotypes can be toned with a range of different plants which contain tannins. Also in the following section, I discuss the experience of viewing silver nitrate and ascorbic acid underneath the microscope. As I saw the silver nitrate and ascorbic acid crystallise, I witnessed how dynamic light sensitive, photographic materials can be. I became acutely aware of the agency of the physical matter that I am using to create my artworks.

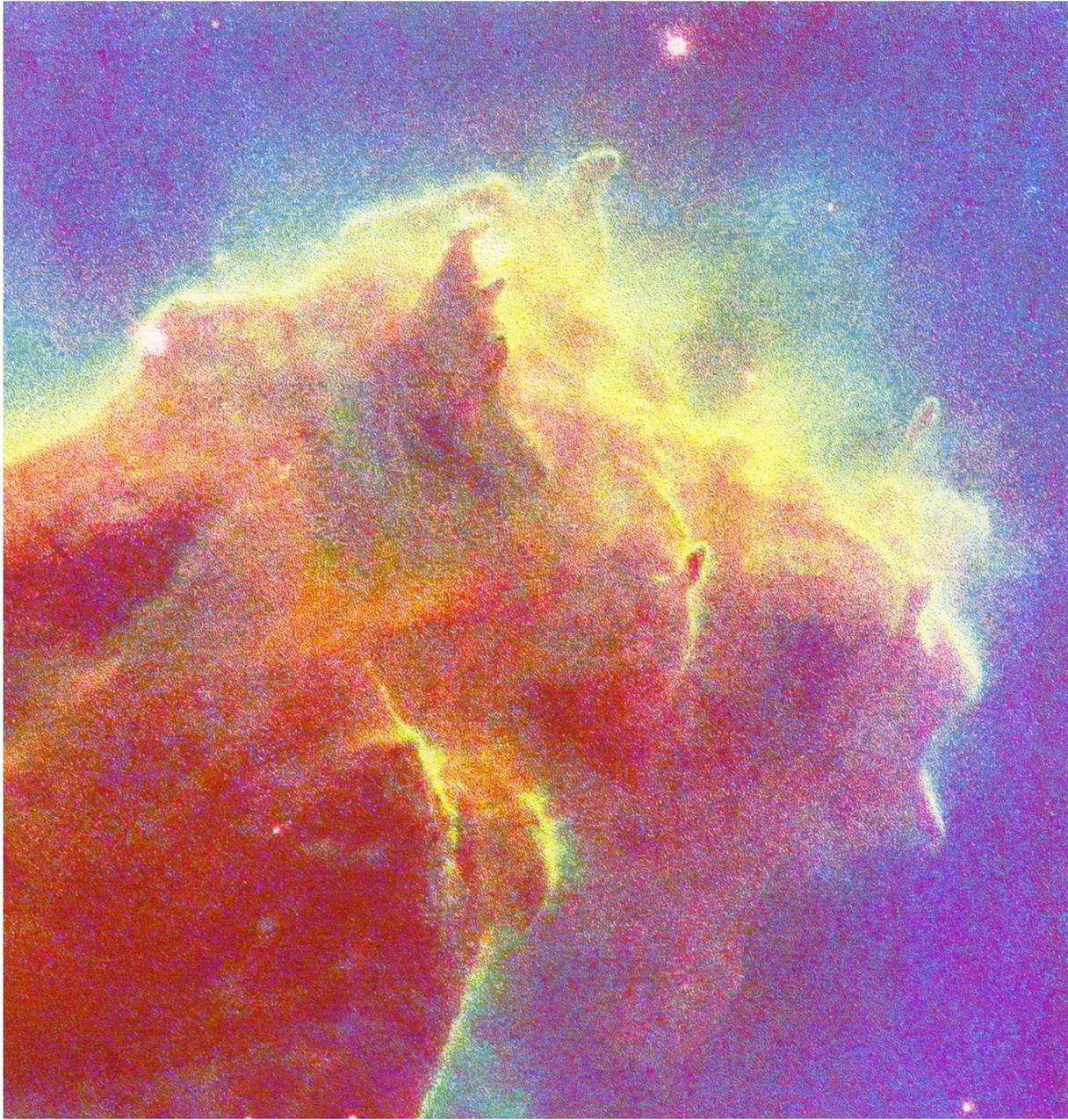
To summarise *In First Light*, I worked with astronomical images that were produced by institutions such as NASA and the European Space Agency. Elizabeth Kessler's text allowed me to understand how astronomical images are made up of composites of several different light frequencies. I was curious how it may be possible to make images that have minimal mediations, to allow light from the stars to interact directly with photosensitive material. This curiosity led me to begin creating long exposure photographs of the night sky using Ilford Delta 3200 (high-ISO) film during several residencies in dark sky spaces and at observatories to produce images for my *Ancient Light* series. In the next section of the Portfolio, I will discuss this project in depth.



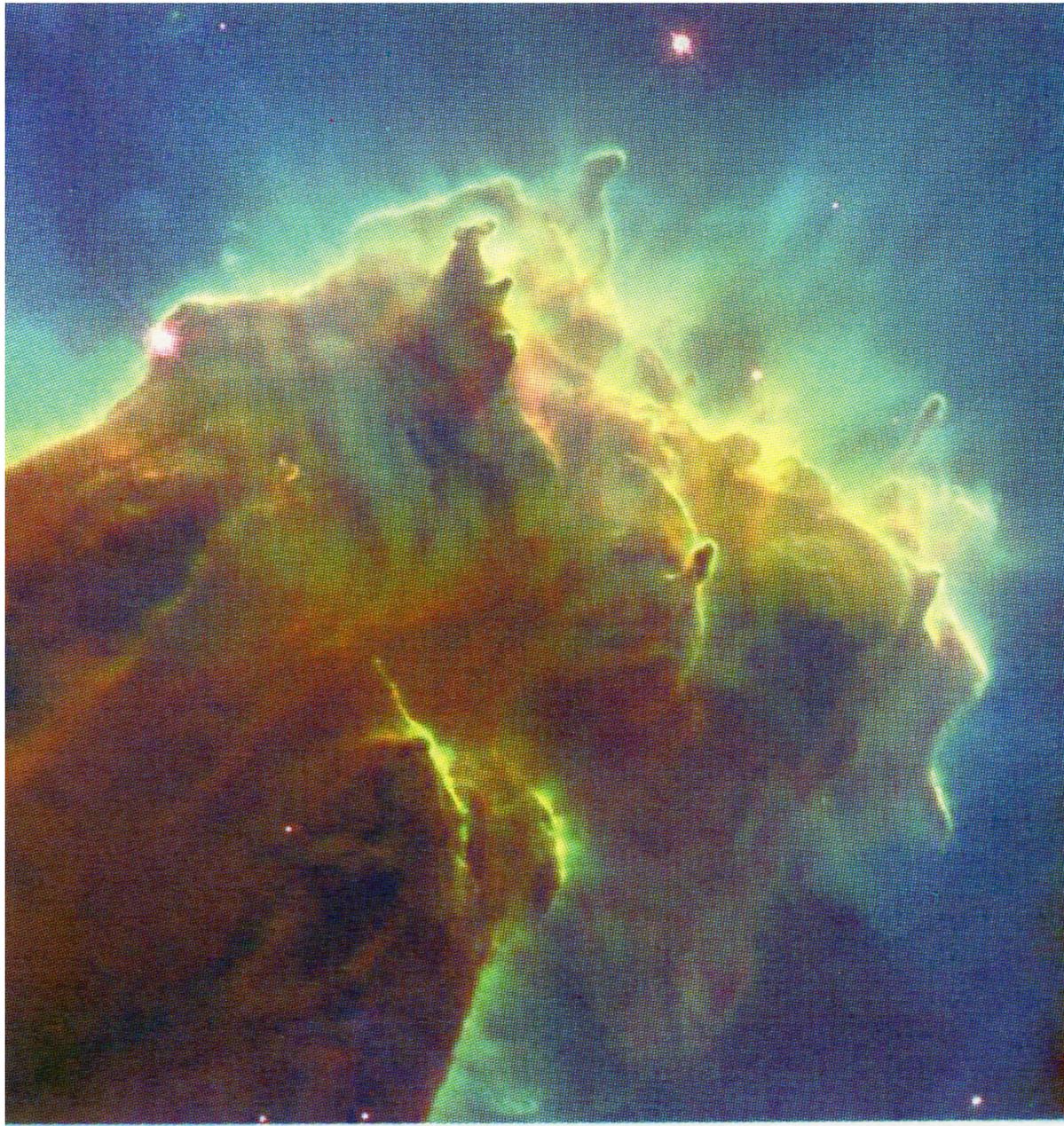
Pillars Of Creation, Lenticular Print, 2016. Approx 1x1m.
Installation at To The Edge of Time Exhibition, KU Leuven, Belgium, 2021-2022.



Pillars Of Creation, CMYK A1 Screen Print, 2018.



Pillars Of Creation, CMYK Screen Print: Diffusion Dither, 2018. 20x20cm



Pillars Of Creation, CMYK Screen Print, 2018. 20x20cm



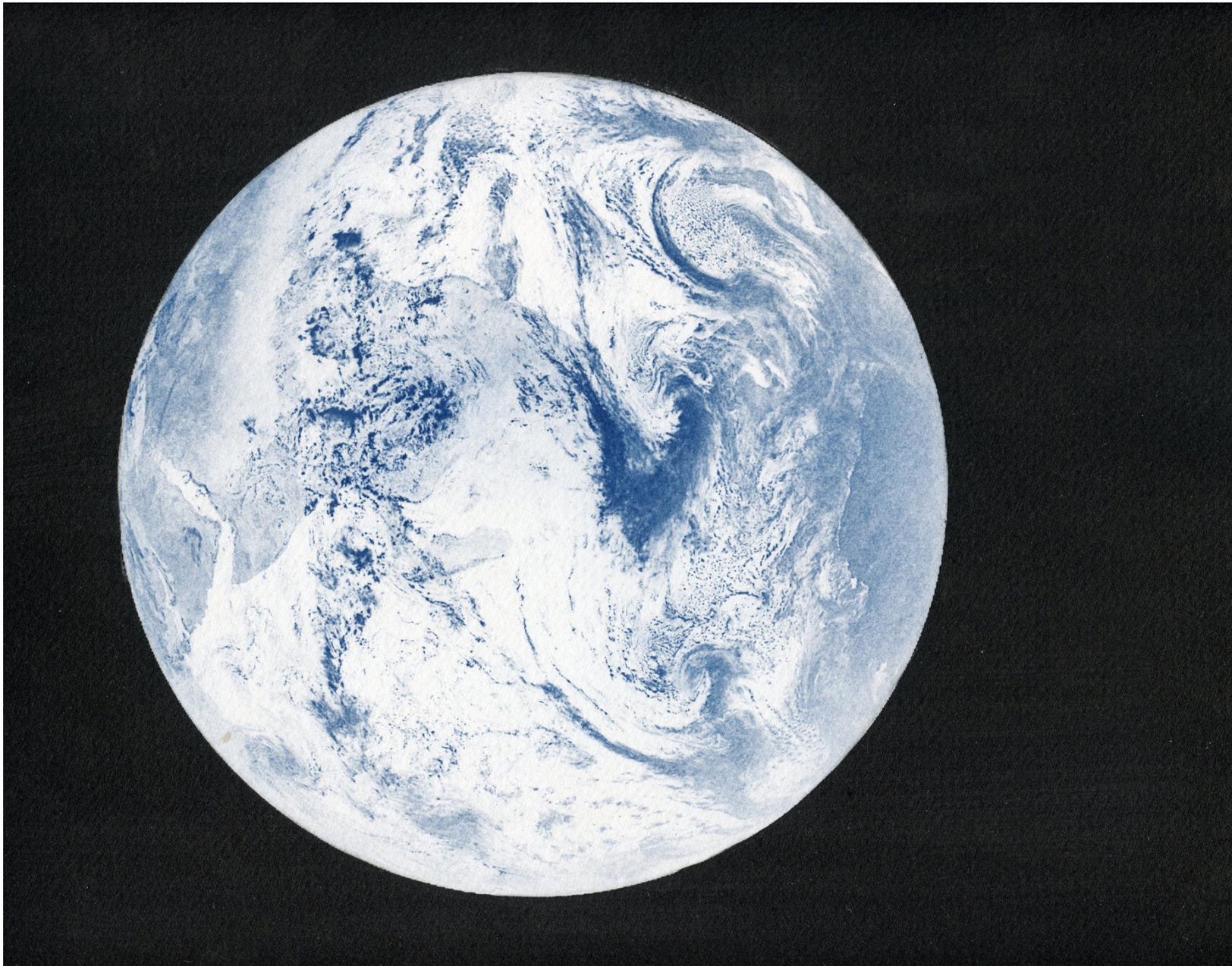
Installation of First Light, Leeds Art University, 2017. Installation approx 5x2.5m



Installation of First Light, Leeds Art University, 2017. Installation approx 5x2.5m



Installation of First Light, Leeds Art University, 2017. Installation approx 5 x 2.5m



Pale Blue Dot, Cyanotype and Photo Etching, 2016. 30x30cm



First Light: Full Moon, Photogravure, 2015.10x10cm



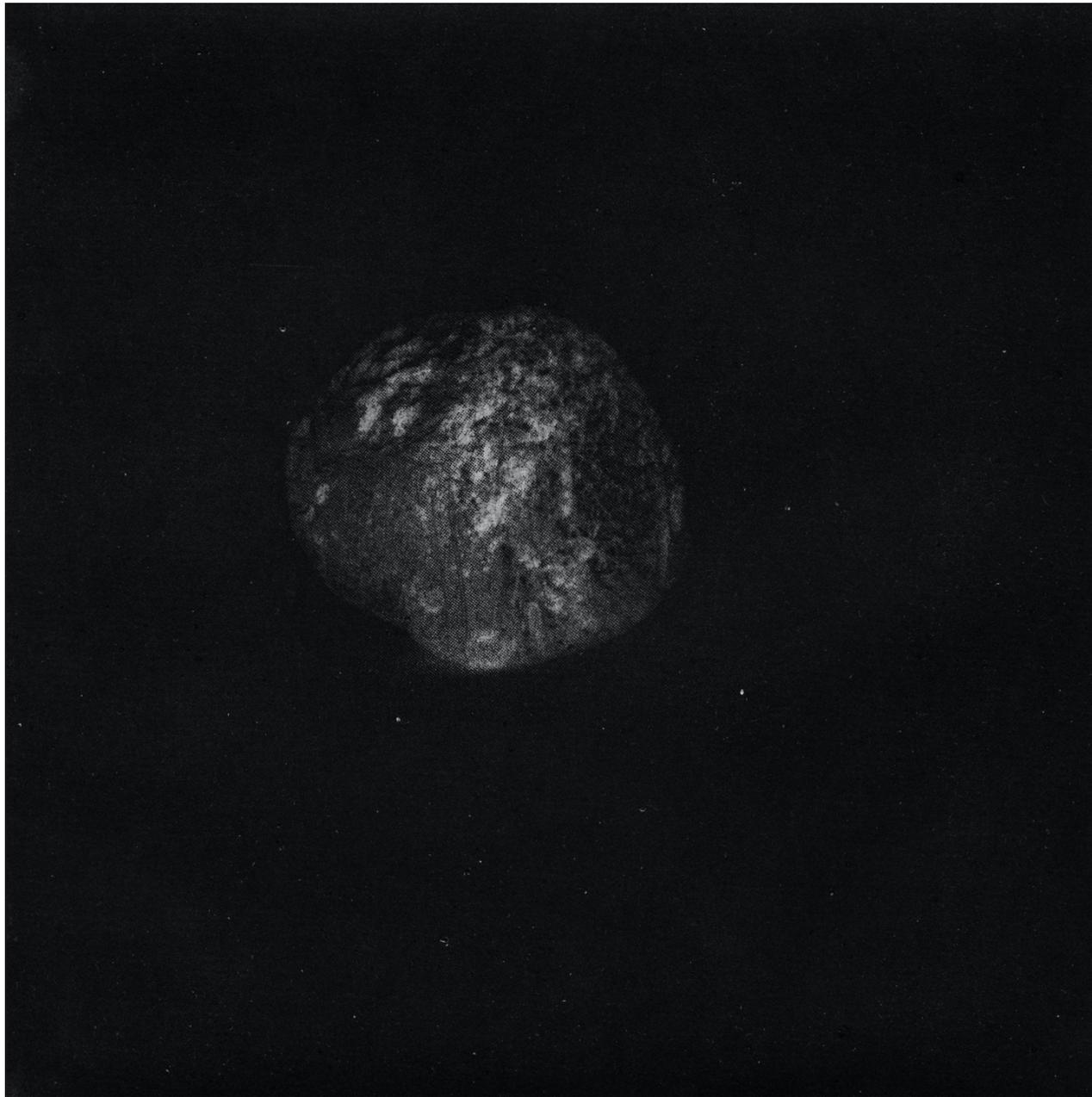
First Light, Full Moon at Kielder Observatory, UK, Becquerel Daguerreotype, 2017. 5x4" plate



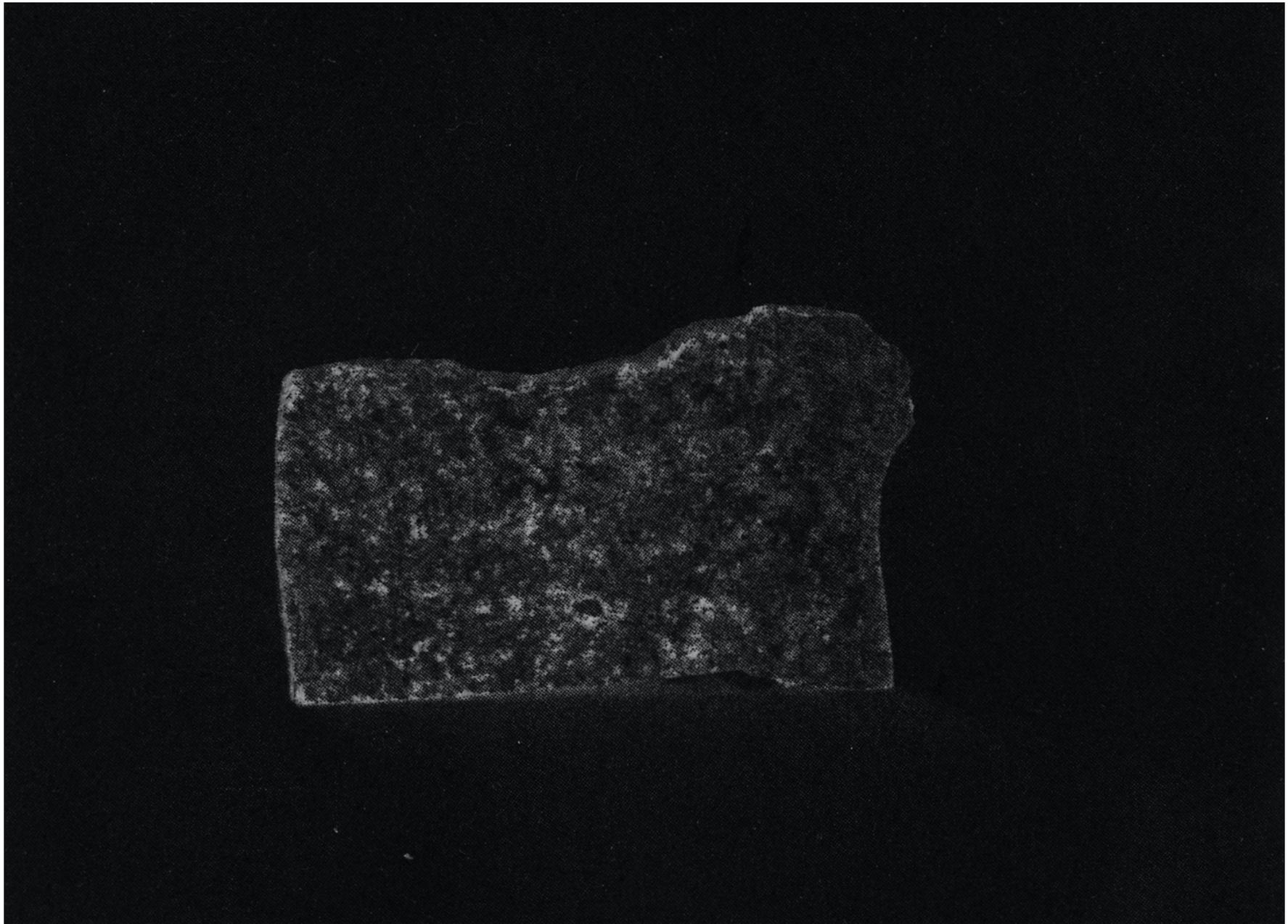
First Light, Mercury (NASA Image), Becquerel Daguerreotype, 2016. 5x4" plate
Installation photograph at Jarvis Dooney Galerie, Berlin, 2016.



First Light, Mercury (NASA Image), Becquerel Daguerreotype, 2016. 5x4" plate



Meteotype, Photographic etching with meteorite-imbued ink, 2016. 20x20cm



Meteotype, Photographic etching with meteorite-imbued ink, 2016. Approx 20cm



Chapter 4: The Sustainability of Photography



Ancient Light, Kilpisjarvi, Finland, Green Tea Toned Cyanotype, 2022. 16x20" print



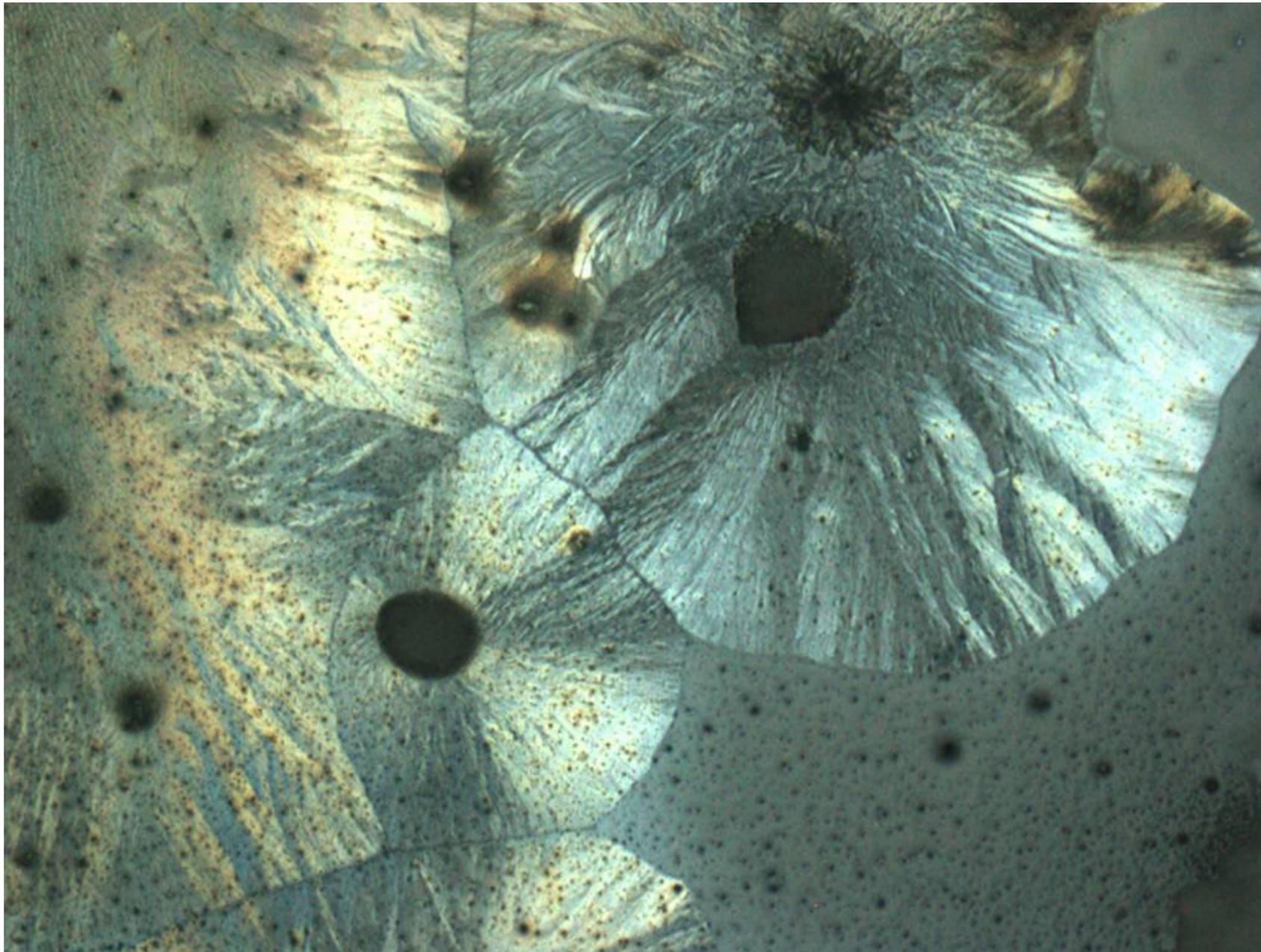
Ancient Light, Kilpisjarvi, Finland, Green Tea Toned Cyanotype, 2022. 16x20" print



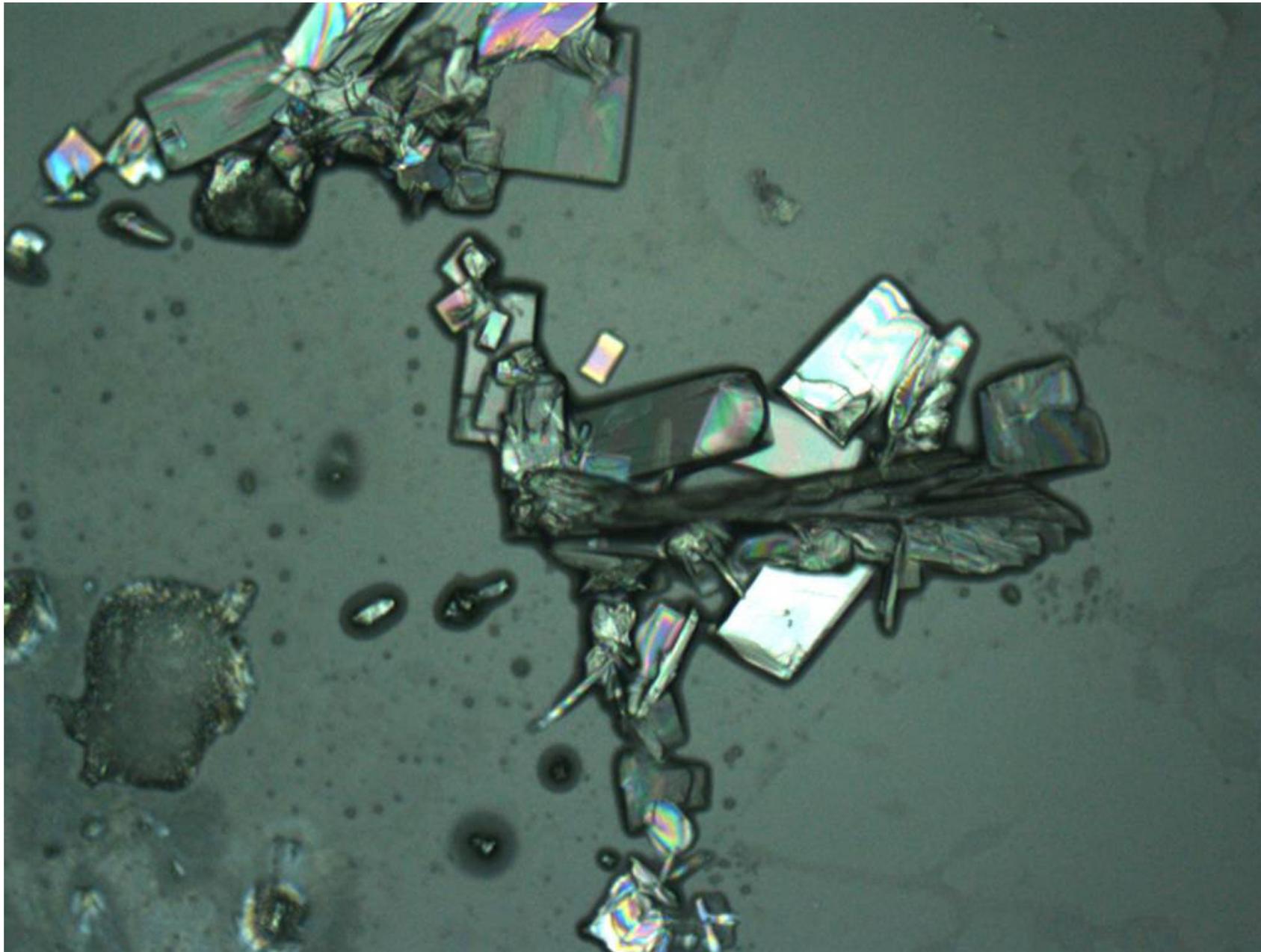
Ancient Light, Andalucia, Spain, Green Tea Toned Cyanotype, 2022. 16x20" print



Ancient Light, Cambridge, UK, Silver Gelatin Photograph, Caffinol-C (Coffee) Paper Developer, 2021 16x20" print



Silver Nitrate and Ascorbic Acid, Microscope Photograph, 2021. 10x8" print
A collaboration with Dr Leah-Nani Alconcel at the School of Metallurgy and Materials at the University of Birmingham



Silver Nitrate and Ascorbic Acid, Microscope Photograph, 2021. 10x8" print
A collaboration with Dr Leah-Nani Alconcel at the School of Metallurgy and Materials at the University of Birmingham



Ancient Light, The Moon at UCL Observatory with Theo Schlichter, UK, Silver Gelatin Photograph, Caffinol-C (Coffee)
Paper Developer, 2021. 16x20" print



Ancient Light, Margate, UK, Silver Gelatin Photograph, Caffinol-C (Coffee) Paper Developer, 2021. 16x20" print



Ancient Light, Grizedale, UK, Silver Gelatin Photograph, Caffinol-C (Coffee) Paper Developer, 2021. 16x20" print



Ancient Light, Vik I Myrdal, Iceland Silver Gelatin Photograph, Caffinol-C (Coffee) Paper Developer, 2021. 16x20" print



Ancient Light, Penryn, Silver Gelatin Photograph, Caffinol-C (Coffee) Film Developer, 2020. 20x20cm

Precious Metals

Precious Metals (2021-2022) is a project which considers the materiality of silver and palladium, from their production within the cosmos, extraction from Earth and their uses within our society.

The project focused on silver and palladium use in photography, suggesting methods of using the materials that are less harmful to the environment. The project lasted from February 2021 until July 2022, and culminated in a solo exhibition at Photofusion in London.

In this project, I produced silver gelatin prints from my *Ancient Light* series using caffenol-c developer. Caffinol-C is an established plant-based developer, which has been in existence since 1995. This developer has been adapted for numerous film types and paper stocks, using a variety of different recipes. There are caffenol-c recipes that tint photographic paper, whilst other recipes produce clear results which are comparable to standard photographic developer.

For the *Ancient Light* prints, I chose to use a developer recipe which tints photographic prints with a pale brown colour. Once ready, the developer takes between five to ten minutes to produce a print. The enlarged developing time allows for control to be taken on the contrast of the print. However, the organic developer leaves artefacts on the photographic print which are difficult to control. I chose to use this particular caffenol-c recipe to produce unexpected results that are more-than-representational.

In addition to the conceptual idea of more-than-representational photography, the prints are set apart from their more traditional counterparts. In previous years, I took pride in producing high quality analogue photographic prints using standard hydroquinone based developers.

These prints were beautiful, but they were very similar to other analogue images of astronomical phenomena. The prints made using sustainable photographic processes offer a novel approach to astronomical imaging.

Silver Reclamation

When the caffenol prints were fixed, the prints released silver into the photographic fixative. If silver is not reclaimed and enters the water system, it can cause fatality to aquatic organisms and can interfere with water treatment facilities.

At The University of Birmingham, I worked alongside Dr Leah-Nani Alconcel, using an electrolysis technique to reclaim silver from the photographic fixative produced by the caffenol prints. Myself and Dr Alconcel adapted a method from Charlotte Padgham, a jewellery designer, who makes a circuit with a battery and a power supply which emits 0.3 amps at 6 volts. Padgham uses an anode (graphite stick) and a cathode (copper object).

The circuit is completed when the anode and cathode are put into the photographic fixative. As electrical signals are passed through the fixative, unexposed silver is attracted to the copper. As the fixative is heated up, hydrogen sulphide gas is released. This gas can be fatal in large doses, so myself and Dr Alconcel used a fuming hood to extract the gases. We then tried out different ampages to work out an optimum ampage for plating. Our most successful result was at 0.5 amps, running the power supply for 25 minutes. In addition to copper, we also plated brass which resulted in a finish due to the elevated conductivity of brass in comparison to copper.

We then used *Hagerty's Silver Polish* and *Goddards Silver Dip* to seal the surface of the silver. At Photofusion, I chose to display the copper and brass items in a vitrine. I coated copper jewellery that I had handmade, in addition to copper and brass discs that were produced. I chose to make copper jewellery to signify the precious nature of silver particles that would otherwise be discarded. The silver-plated objects were then shown alongside the *Ancient Light* prints made from coffee developer, whose unexposed silver had been used to plate the jewellery.

The *Precious Metals* exhibition also included platinum-palladium prints of the Butterfly, Elephant Trunk and Horsehead Nebulae. In addition to this, becquerel daguerreotypes of the Crab Nebulae, Bubble Nebulae and Pillars Of Creation formation within the Eagle Nebulae were shown. These prints were produced to highlight the cosmic origin of silver and palladium within high energy stellar events.

The daguerreotypes were produced using the becquerel process, where silver plated copper sheets are exposed to iodine gas without the accompaniment of mercury. The daguerreotypes were produced at a scale of four by five inches and the platinum-palladium prints were produced at ten by eight inches. The prints were framed with white mounts, white frames, and non-reflective glass to minimise distraction from the artworks inside.

Within this project, I also produced cyanotypes from the *Ancient Light* series of photographs and toned the prints using green tea. I chose green tea to tone the cyanotypes, as the tannin in the tea transforms the cyanotype blue tone to purple or black. Other tannin-based cyanotype toners tend to tint cyanotype highlights, reducing the contrast of the resultant print. I chose to tone the cyanotype for thirty minutes, allowing the print to take on a deep burgundy-purple colour.

If I had toned the cyanotype for longer, the dark areas of the print would become black. However, it is possible that the highlights within the image could also be likely to darkened, which would have affected the overall contrast of the print. These iron-based prints were shown within this context to show a viable alternative to silver prints. These prints allowed me to work with organic, natural materials – allowing non-human agents to have an influence on the final print.

Finally, with Dr Leah-Nani Alconcel, I produced a series of digital photographs using microscopes to observed the crystallisation process which happens when silver nitrate reacts with ascorbic acid. Myself and Dr Alconcel were keen to learn more about the structure of silver particles on a microscopic level. This process cemented my conception of silver as a lively, dynamic medium as I could see it physically morphing within the lens of the microscope.

These photographs were printed on a sustainable paper stock. Most of the prints were created at a scale of ten by eight inches. However, one photograph was produced at A0 size. Overall, this exhibition was designed to prompt the viewer to consider the materiality of silver from several perspectives, from a microscopic scale within the images of silver nitrate and ascorbic acid to the images of vast supernovae.



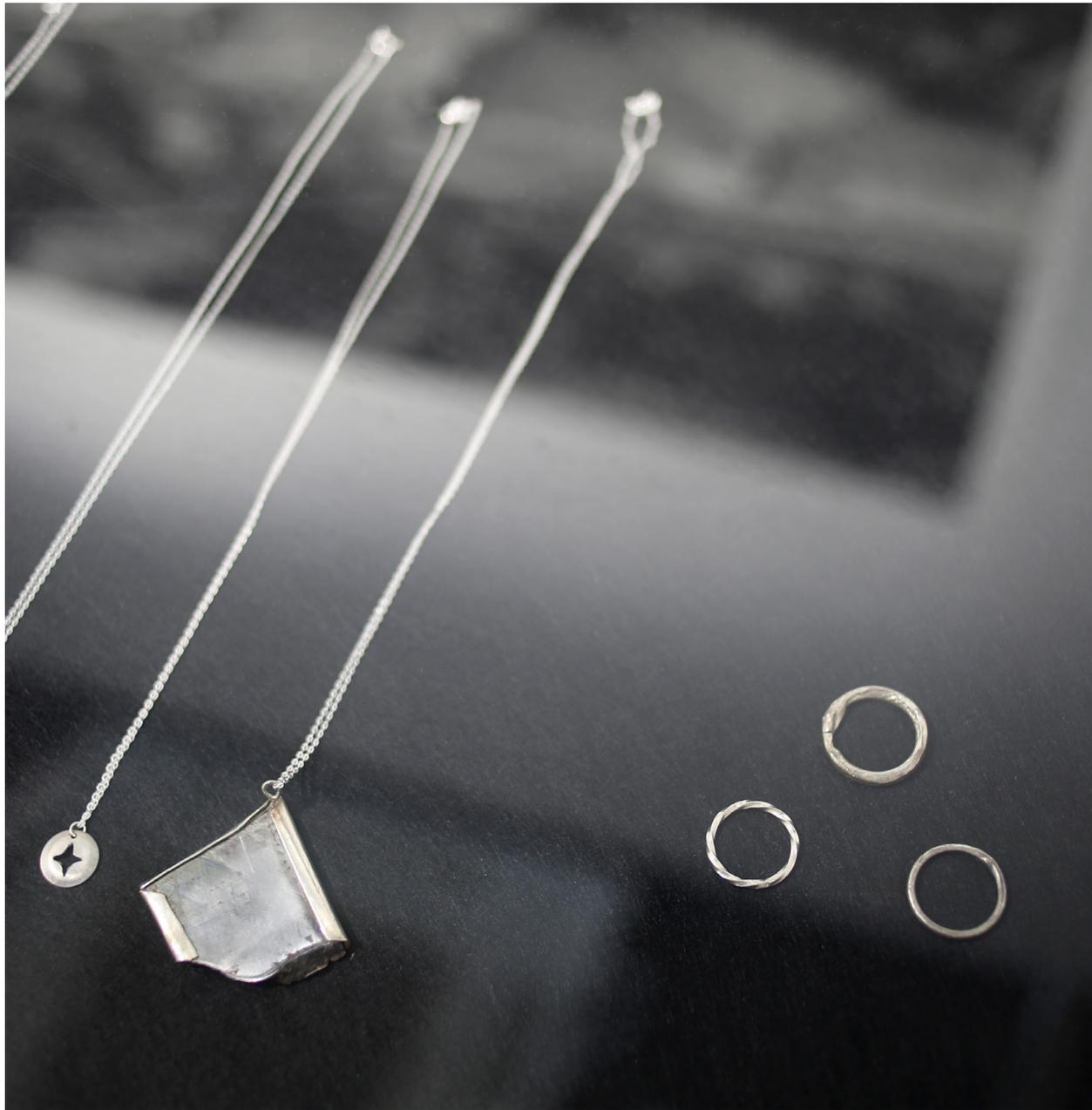
Installation of Precious Metals: The Cosmic Origin Of Silver & Palladium, Photofusion, London, 2022.



Installation of Precious Metals: The Cosmic Origin Of Silver & Palladium, Photofusion, London, 2022.



Installation of Precious Metals: The Cosmic Origin Of Silver & Palladium, Photofusion, London, 2022.



Silver Jewellery Plated With Photographic Fixer, 2021.

A collaboration with Dr Leah-Nani Alconcel at the School of Metallurgy and Materials at the University of Birmingham.



Silver Jewellery Plated With Photographic Fixer, 2021.

A collaboration with Dr Leah-Nani Alconcel at the School of Metallurgy and Materials at the University of Birmingham.



Precious Metals: The Cosmic Origin Of Silver & Palladium, Butterfly Nebula, Platinum-Palladium Print, 2021. 10x8" print



Precious Metals: The Cosmic Origin Of Silver & Palladium, Elephant Trunk Nebula, Platinum-Palladium Print, 2021 10x8" print



Precious Metals: The Cosmic Origin Of Silver & Palladium, Horsehead Nebula, Platinum-Palladium Print, 2021 10x8" print



Copper Pendant, Silver Plated With Photographic Fixer, 2021. Approx 2.5cm diameter

A collaboration with Dr Leah-Nani Alconcel at the School of Metallurgy and Materials at the University of Birmingham and Godessa Jewellery.



Copper Cuff (Reclaimed Pipe), Silver Plated With Photographic Fixer, 2021. Approx. 8cm oval diameter
A collaboration with Dr Leah-Nani Alconcel at the School of Metallurgy and Materials at the University of Birmingham.

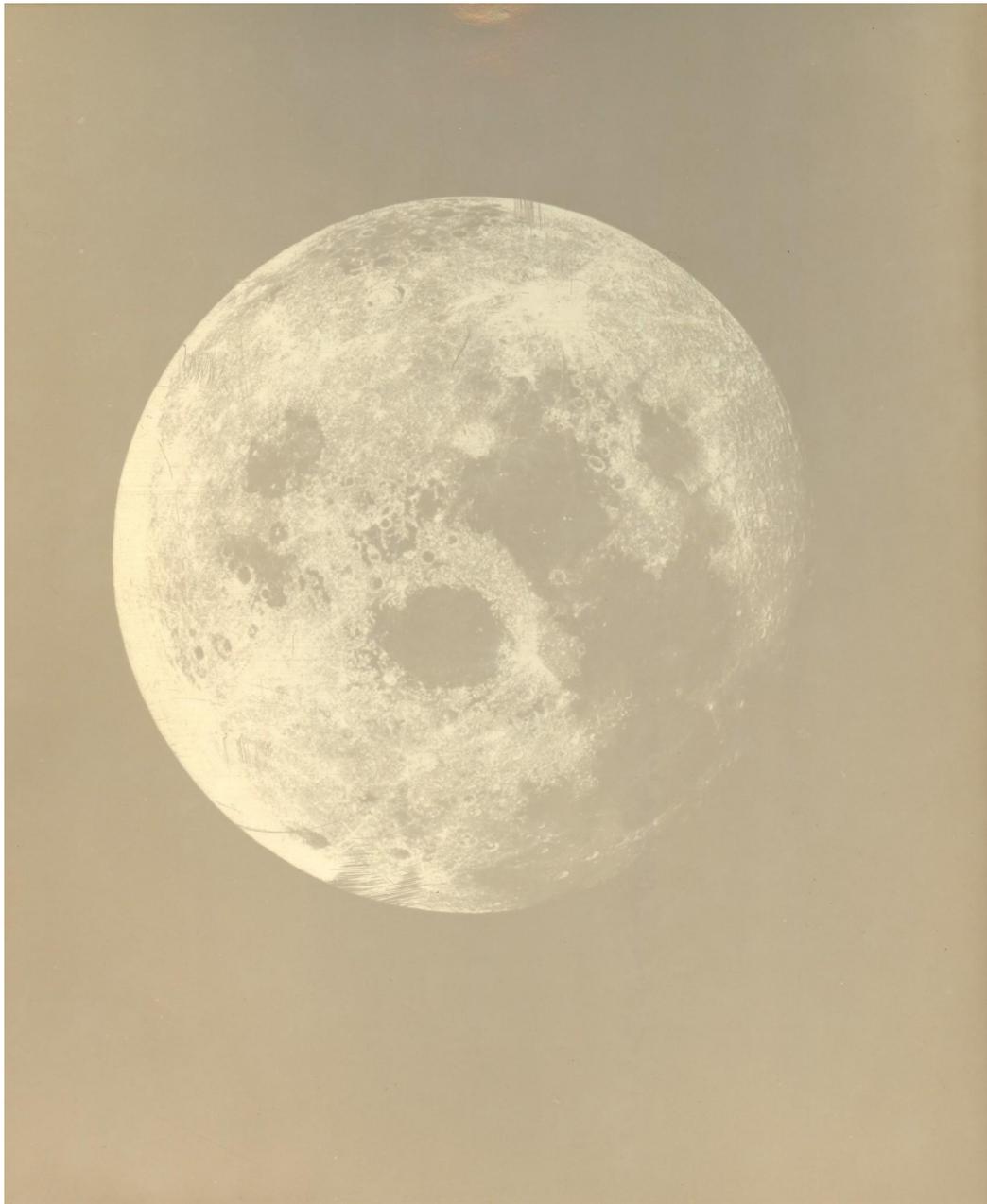


Copper Cuff (Reclaimed Pipe), Silver Plated With Photographic Fixer, 2021. Approx. 8cm oval diameter
A collaboration with Dr Leah-Nani Alconcel at the School of Metallurgy and Materials at the University of Birmingham.

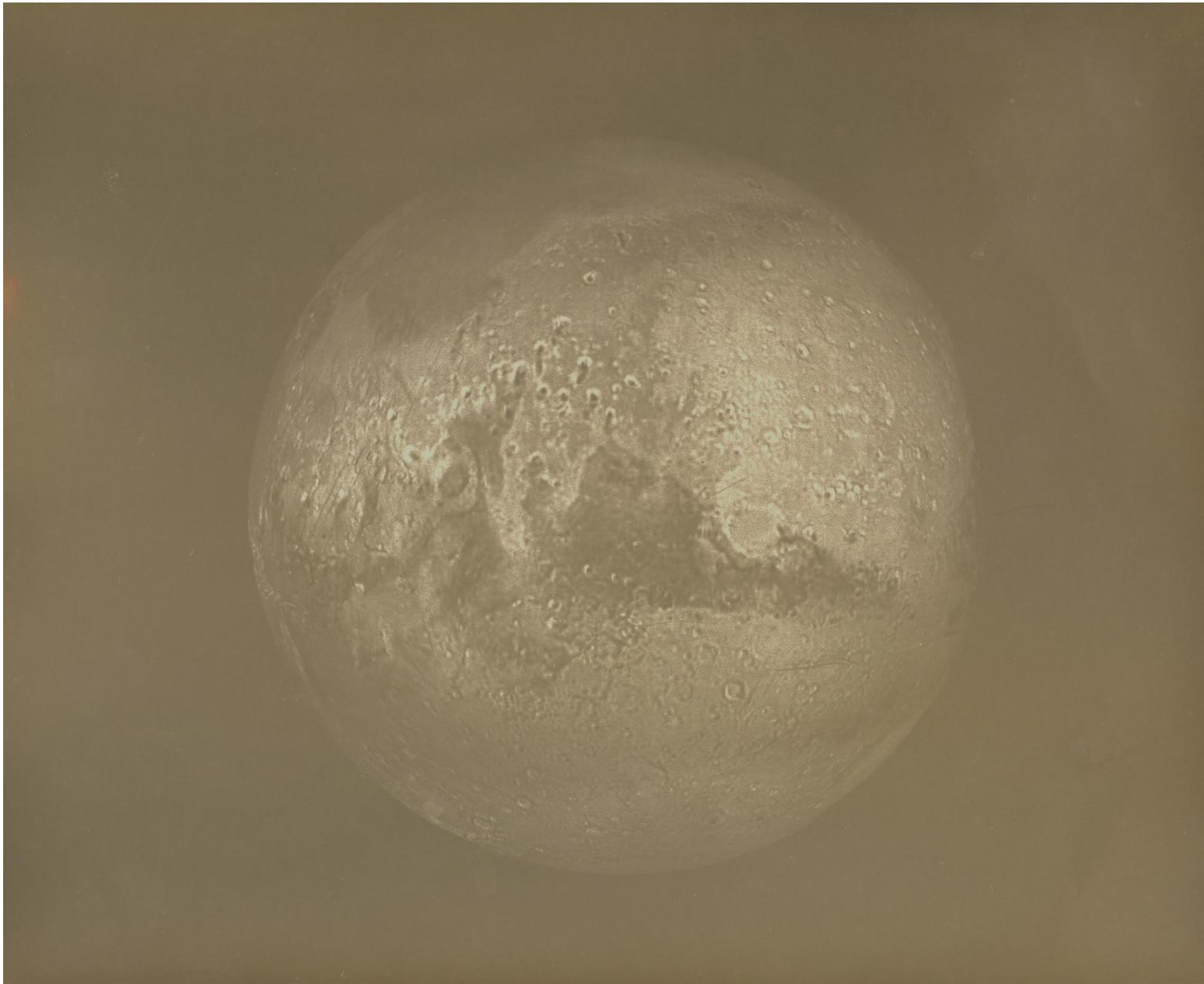


Copper Pendant, Silver Plated, 2021. Approx. 5cm diameter

A collaboration with Dr Leah-Nani Alconcel at the School of Metallurgy and Materials at the University of Birmingham and Godessa Jewellery.



Full Moon (NASA Image), Silver Gelatin Photograph, Caffinol-C (Coffee) Paper Developer, 2021. 10x8" print



Mars (NASA Image), Silver Gelatin Photograph, Caffinol-C (Coffee) Paper Developer, 2021. 10x8" print



Saturn (NASA Image), Silver Gelatin Photograph, Caffinol-C (Coffee) Paper Developer, 2021. 10x8" print

Submerged Landscapes

Submerged Landscapes is a project focused upon the threat of climate change and tidal rising within my local area of Thanet.

Between the last glacial period (around 5000BC) and the nineteenth century, Thanet was an island surrounded by the North Sea. From 1800, the land around Thanet was drained for farming purposes.

Now, as the tides rise, it is possible that Thanet may become an island again as surrounding areas are flooded.

This project documented affected areas such as Pegwell Bay, Sarre and Reculver. These photographs were produced using black and white silver-gelatin film. I adapted seaweed film developer recipes which were designed for 16mm film stock.

It was important for me to produce these images using sustainable photographic processes, using materials that can be found in the ocean. The resultant images are grainy and the developer fogs the image, lending the image a misty appearance.



Submerged Landscapes: Ramsgate, Silver Gelatin Photograph, Seaweed Film Developer, 2021. 10x8" print



Submerged Landscapes: Pegwell Bay, Silver Gelatin Photograph, Seaweed Film Developer, 2021.



Submerged Landscapes: Sarre, Silver Gelatin Photograph, Seaweed Film Developer, 2021. 10x8" print

1:1. Infinity.

30/40 seconds per frame -
2 nights + 1 experimental long
exposure.



James Holcombe - replacement
arm.

2.8 lens. - 50 seconds.

wide angle.

Tri-X

Moon.

16mm Ektachrome.

Andar Berlin.
Niagara in Toronto, N.Y.

Brussels - Cinema Parenthesis.

Bolex

4000 frames adds up to 4 nights on a
clear night, 30 seconds each. When the film is
played back this will equal to 2.5 minutes.

The slow accumulation of photons, making evident
the spin of the planet. Automation - to set
this up and let ~~the~~ the intervalometer press the
button. With stills film, I am more engaged,
more in control.

The time it takes the photon to reach the film,
the time it takes the film to be completed. ~~At~~
Compressed time.

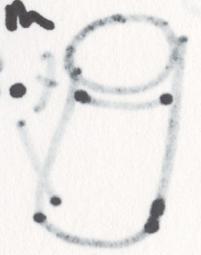
To project, light shining around ancient light.
The physicality of the film will be seen +
heard.

Notebook scans showing different camera exposure settings.

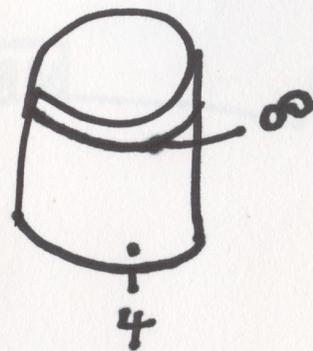
Nelanie MAMIYA 64S STAR TRAILS.

ON BULB
 REMOTE WIRE
 f4 - Mamiya 64S
 30 mins / Delta 3200.

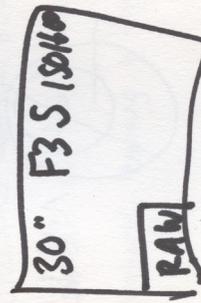
f. 2.8 / f100m



Bulb = 30 mins.



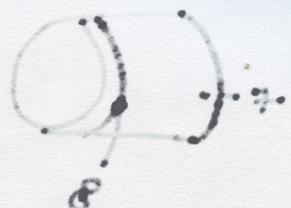
CANON SS0D
 Milky way
 INFINITY.
 30 mins exposure
 Shot Raw F3.5
 Daylight.
 greeksky.gr



MAMIYA 64S
 REMOTE WIRE
 ON BULB
 30 mins / Delta 3200
 f. 2.8 / f100m



15 mins = 15



Notebook scans showing different camera exposure settings.

Fry Telescope Exposure
UCLLO Observatory.

- ~~1. 10 seconds~~
- ~~2. 15 seconds~~
- ~~3. 20 seconds~~
- ~~4. 25 seconds~~
- ~~5. 30 seconds~~

Notebook scan showing specific camera exposure settings, set by Theo Schlichter at UCLLO Observatory



5 seconds.JPG



10 seconds.JPG



20 seconds.JPG



25 seconds.JPG



30 seconds.JPG

Contact sheet shows results of different exposures.

Gizedale

In Search of Darkness but it never got fully dark. We waited until midnight for the stars to fully appear. It was 1am before the light was gone and we ~~still~~ were still affected by light from nearby towns.

Cassiopeia emerging above the trees, Ursa Major brightly shining through.

Satellites littering the sky

Ancient Oak trees dizzied by what seems like a spinning sky.

Imagine what time feels like for them. ~~them~~

To find a dark place we wandered up steep slate paths, sometimes on our hands and knees. We found a clearing with a perfectly framed view of the sky. Hand torches that only just illuminated the path ahead a few feet ahead. Keeping together so we don't lose a friend in the dark. Fear of falling down a crag + talk of 'The Bogle'. Silene + reverence interspersed by silly jokes. The ranger talking about wildness + animal rights activists with disdain. Keeping one species alive means killing another - this is how nature works. Death is

Notebook scans showing written, unedited vignettes. These notes were written directly soon after seeing the night sky during residencies.

12 Feb

barb start - the only clear part ^{this} weekend.

Diving to the dark close to the airport

Blinker - the ~~old~~ winter night which sparkles. Glitter of the snow mirroring

the milky way sky. Moonless ~~&~~ night but the sodium light illuminates the snow. The sky is so ~~damn~~ beautiful that

I forget the severe pain in my hands

Hands ~~are~~ caught in my tripod, bleeding + losing feeling

After 20 mins I am in physical pain + my hands seize up.

Massive snowfall, I can't even see where I am going. Knees deep

Scared to go further in case the 4x4 gets swallowed up.

Notebook scans showing written, unedited vignettes. These notes were written directly soon after seeing the night sky during residencies.

CAFFFC PAPER RECIPE

Start 800ml hot water
27g soda
18g vit C
17g coffee
1000ml

5 mins pale gold

10 mins
dev
normal
stop + fix

could be longer
dev time.

Caffenol Delta recipe

24g soda
20g vit C
48g instant coffee/wine
develop 33 mins coffee.
1hr 30 with wine.

seaweed dev

- 50g of soda - 150ml water
- 12g of vitc
- add 150ml of seaweed brew
- heat to 26 deg
- Invert tank every 2 mins for 1 hr.
- Wash, Fix
- Dry.

Notebook scans showing various notes made whilst trying out different plant based developer recipes for Ilford HP5 film. These notes enabled me to find optimum developing times and temperatures.

300ml of water
 150 ml wine
 40g of sod
 10g of vit c

★

~~stand~~ stand. overnight
 leave in tank for
 30 mins

SEAWEED

- handful

Pour boiling water over a handful of seaweed. Cool down to 35°
 Strain.
 12g vitamin c
 50g soda
 15 mins dev time.

Seaweed 18.30
 12g vit c
 50g soda

30° ~~30°~~ 20°
 15 mins 15 mins scrub
 45 mins stand 10 min stand
 5 min rapid fix
 + silver → copper

Notebook scans showing various notes made whilst trying out different plant based developer recipes for Ilford HP5 film. These notes enabled me to find optimum developing times and temperatures.

