



ANGELA PALMER

Life Lines

Cover: Detail of Eclipse, full details and image on pages 22-23
Below: Angela Palmer with dust mask, engraving in her studio



Angela Palmer

Life Lines

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Foreword

Ask Angela Palmer what her work is about and she will reply with a single word: *mapping*. Those who know her previous exhibits will recognise, immediately and visually, the truth of her answer. Just as the topographical contours of an Ordnance Survey map relay both information and beauty, Palmer’s sculptures, built up plane by plane from multiple sheets of glass, delineate through line the complexity and elegance of the human body. From digital information provided by MRI and CT scanners – machines less hearteningly usually deployed to chart abnormality and illness – she delivers art.

Her new exhibition, however, asks us to consider the journeys her works now map. Collectively, they record an extraordinary artistic expedition through space and time. Historically speaking, the show takes us from Ancient Egypt through the eighteenth century, to the present day. Spatially, it is a voyage that begins from within the inner-space contained by the human (and animal) frame, and ends by flinging us into the unimaginable distances that astronomers represent in light years, multiples of the distance light travels in a year, which is nearly six million million miles.

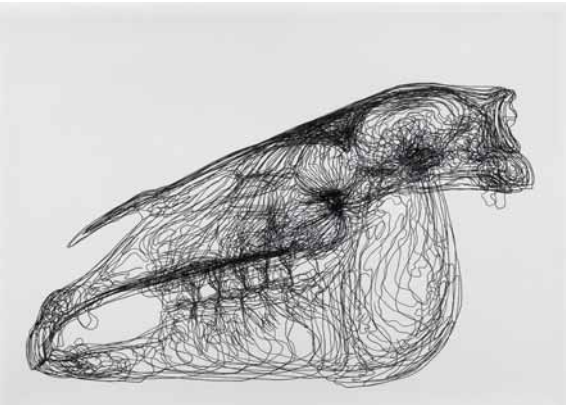
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To begin in human history, the nested coffins of the eighth century BC Theban priest Djeddjehutyuefankh – familiarly known to the artist as Djed - exhibited in Oxford’s Ashmolean Museum represent the heavens on a painted lid depicting a sun god being towed across the sky. But, as in her *Ashmolean Mummy Boy* on permanent display in the museum’s Egyptian galleries, Palmer is less interested in the Egyptian paraphernalia of death than in the human body within the mummification. The scan of Djed conducted last autumn at the Churchill Hospital, Oxford, provided an intimate portrait of an Egyptian male



Above right: Detail of The Ashmolean Theban Priest
Full details and image on pages 32-33

adult of average height for his epoch (5ft 2in) who died in his prime. After nearly 3000 years it also uncovered (although not, of course, literally), a bizarre and intimate secret: Djed has no heart although it is possible this is what is contained in the linen-wrapped parcel that rests on his knees.



Like almost all of today’s thoroughbred racers, the legendary eighteenth century horse Eclipse has a heritage that can also ultimately be traced to Egypt. For this piece, the skull of the horse, like Djed’s skeleton, was placed in a scanner, from which Palmer was able to build an inside-out sculpture. It is a portrait of a winner so habitual that in the end his career was ended by its own success. Impossible to bet against, or to be eclipsed, Eclipse was put to stud, from where he sired about 500 foals and three Derby winners. From his death in 1789, this horse, its remains preserved and treasured by the Royal

Veterinary College, has been an object of scientific fascination, starting with Charles Vial de Sainbel’s publication of his post-mortem findings and continuing to today where scientists from the RVC and the University of Cambridge have analysed his DNA. Here Palmer again closes the gap between art and science. Technology is brought into the artist’s service, resulting, perhaps, in the most memorable portrait of the stallion since George Stubbs’ in 1770.

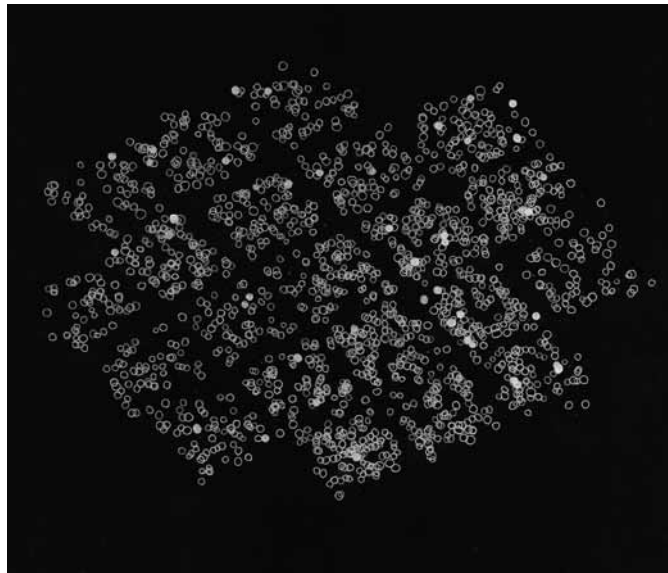
Animal-lover though she is, Palmer would probably nevertheless acknowledge the validity of Alexander Pope’s dictum that the proper study of mankind is man. Her contemporary scan-portrait in this exhibition is of her friend Robert Harris, a novelist. Happily, given her current interests, he is primarily a historical novelist. In this case, however, it was he who was inspired by her. For his 2011 novel *The Fear Index*, he appropriated Palmer’s artistic techniques and awarded them to Gabrielle, the artist wife of his anti-hero, the hedge-fund-manager Alex

Above left: Detail of Eclipse
Full details and image on pages 22-23

Hoffman. *The Fear Index* is a novel that regards the higher maths, as used by financial speculators, as a Frankenstein's monster. Hoffman's algorithms rampage through the world's financial markets in a manner the author assures us is not entirely science fiction. Having persuaded Harris to submit to a 35-minute scan at the John Radcliffe, Palmer produced an intimate portrait of a man at the height of his creative powers. While Harris turned maths into literature, here Palmer transmutes literature, via science, into visual art.

Her breakthrough piece is, nevertheless, of a different order, exploding from introspection into cosmology. *Searching for Goldilocks* is a collaboration with Oxford astrophysicist Dr Chris Lintott, whom Palmer met at the Google SciFoo conference in Palo Alto, California, in August 2011, and physicist Dr Alexy Karenowska. At Lintott's suggestion, it plots on 18 glass sheets the findings of the telescope aboard the Kepler space laboratory which, since 2009, has been charting a region of the Milky Way. At last count, it had found 2,321 planets (or "planet candidates" for they may actually be something else).

4 Karenowska plotted the exact position of each planet from 80 pages of computer read-outs, its digirrhoea not dissimilar to the trading-room data of Harris's novel. Palmer then engraved each planetary system onto glass, each sheet representing a further 250 light years from earth (and, for the terrestrial observer, a further 250 years into the past). The resulting three-dimensional cluster, although made out in tiny circles rather than her usual lines, eerily resembles the shape of the human brains elsewhere in the exhibition – eerily because



Above right: *Searching for Goldilocks*
Full details on pages 40-41

about 40 of the planets are considered by scientists capable of sustaining life. These rocks, neither too hot nor too cold, are known as the "Goldilocks". Palmer modestly differentiates the locations of these other Earths by filling in their circles, so that they appear opaque against the glass.

These tiny cartographic markings - any one of which represents the potential to transform utterly our idea of what it is to be Earthling – speak to another theme of the show. Goldilocks planets are in a sense nothing special, neither fireballs nor ice-traps. Similarly, the posthumous medical examination of the once famous Djed revealed a middle-aged man of no peculiarity: even a fracture to his pelvis is reported as a typically adolescent injury. Scientists examine Eclipse's bones and now his DNA for clues to his greatness, and they find nothing outstanding. Dr Alan Wilson, a team member in the study, said: "Rather than being some freak of nature with incredible properties, he was actually just right in absolutely every way." Eclipse was a Goldilocks.

Palmer's work is the result of long and painstaking craftsmanship which entails her applying an electric drill head to hundreds of panes of glass before they are sent off to be assembled and encased by a precision glass maker in Enfield, north London. Each piece points to the paradox of ordinariness. From certain angles, above and from the side, they become invisible, mere glass. From other vantage points, however, they are exquisite celebrations of when the ordinary become extraordinary. Palmer simultaneously maps the natural and the sublime.

Andrew Billen
Oxford, April 2012



Above: Detail of Robert Harris Portrait 3
Full image and details on pages 10-11



BRING ME THE HEAD OF ROBERT HARRIS

When the artist Angela Palmer found herself featured in the author's latest novel, she set out to create her own 'portrait' of him

It was exactly a year ago that a rather curious proposition arrived by email from the novelist Robert Harris. We'd been friends many years before, but had lost touch. He explained he was now working on the plot for his next novel. The main character was a brilliant physicist-turned-hedge-fund-manager called Alex Hoffman; he wanted him married to an artist. My art, he said, bore a direct correlation to the novel's central theme: artificial intelligence. Robert asked if he could bestow my art on his fictional artist, Gabrielle. There would be no other similarities.

Intrigued, I drove to meet Robert in a country pub hidden in the Berkshire Downs. The novel's title, he disclosed, was *The Fear Index*, so called because of the revolutionary system developed by Hoffman to make billions on the financial markets through tracking human emotions – in this case fear. "I remembered your art," Robert said, "and I thought, it's absolutely perfect. It's an opportunity for Gabrielle to meditate on the brain and on her husband – the brilliant physicist who is losing his mind – and for her husband and other characters in the book to reflect upon it."



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Robert Harris Portrait 1

Based on MRI scans taken at the John Radcliffe Hospital, Oxford

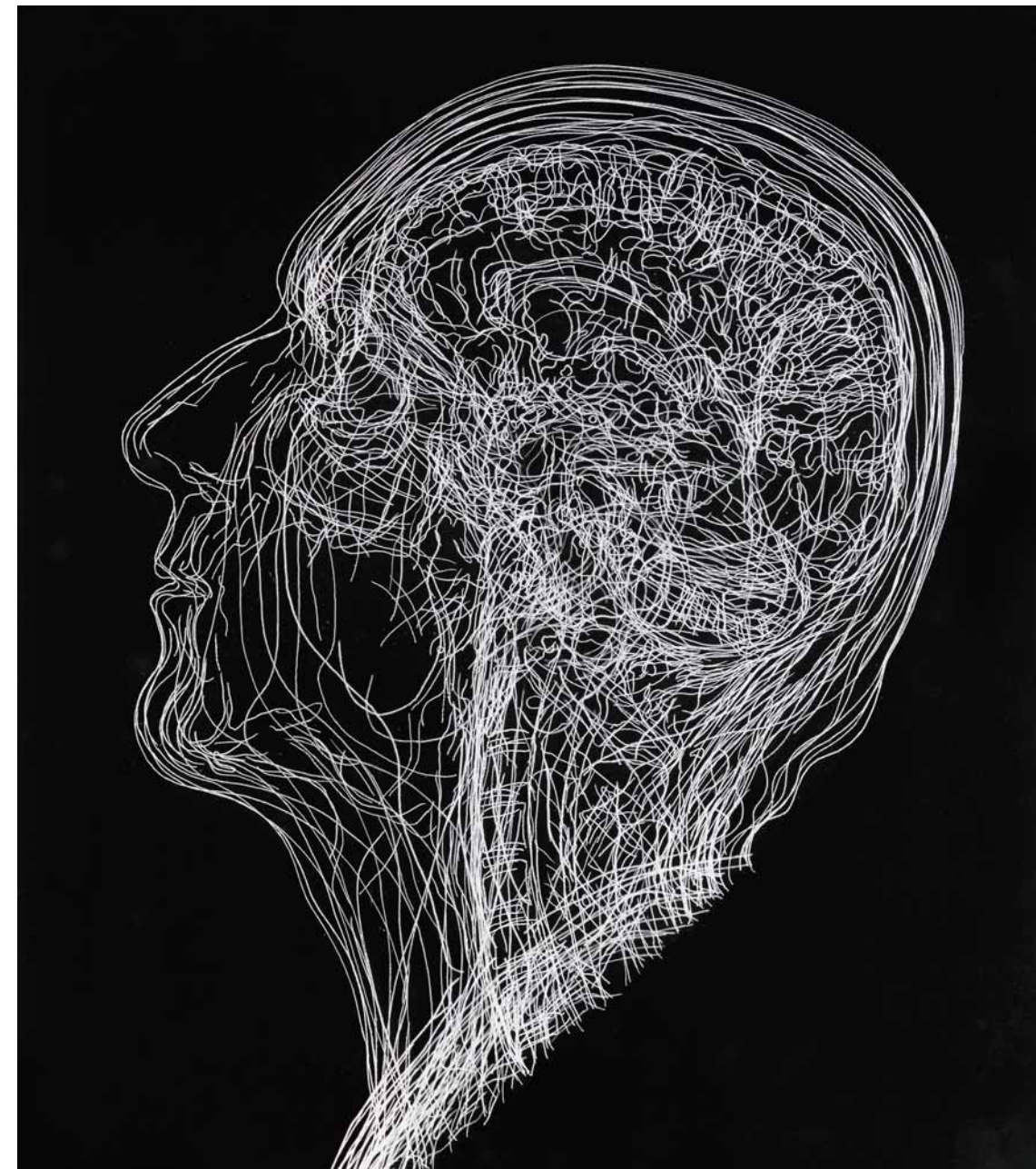
Ink drawing on 23 sheets of Mirogard glass 29 x 27 x 19 cm (series of 5)

Above: The artist with Robert Harris
Image courtesy of the photographer,
Manuel Vazquez

I could follow his train of thought. A few years ago, while studying anatomy at the Ruskin School of Drawing and Fine Art in Oxford, I developed a technique to reconstruct the human body, and in particular the brain, by drawing or engraving details from MRI or CT scans on to multiple sheets of glass, layer by layer. This method allowed me to expose the extraordinary inner architecture concealed beneath the surface of the human form, thus creating the most objective form of portraiture. The image floats ethereally in its glass chamber, but can only be viewed from certain angles; from above and the side it vanishes and the viewer suddenly finds himself staring into a void. Since then I've undergone a series of MRIs myself to create self-portraits, and, most recently, reconstructed a 2,000-year-old Egyptian child mummy to reveal its human form in 3D without disturbing its bandages.

After I agreed to Robert's request, he began to painstakingly elicit every detail of my working life; it was like being complicit in your own identity theft. "Your studio is a Victorian-style conservatory?" he confirmed. "Fine. I'll build that on to the Hoffmans' house." I provided an inventory of my studio, which was replicated down to the tin of Taylors of Harrogate Earl Grey Tea in which I keep my drill heads. During the months of writing, I received updates from Robert. In the opening chapter, Alex Hoffman is violently attacked and is forced to undergo a scan. It struck me that if Robert was so meticulous in his research he should perhaps submit himself to an MRI; meanwhile I could create his portrait from his scans. He agreed in the name of research.

I turned for help to Dr Stephen Golding, a radiologist at the John Radcliffe Hospital in Oxford and collaborator on my previous art projects. It was agreed Robert would be scanned out of hours one evening, for a fee to be paid to the hospital. Robert lay motionless in the tunnel for 35 minutes, allowing the radiologist to acquire the scans I requested – axial, coronal and sagittal. He emerged looking stunned. "It was a completely out of body experience," he said. "I could feel something tangible passing through my head... It was bizarre. It makes one conscious of one's brain as a piece of high-end machinery."

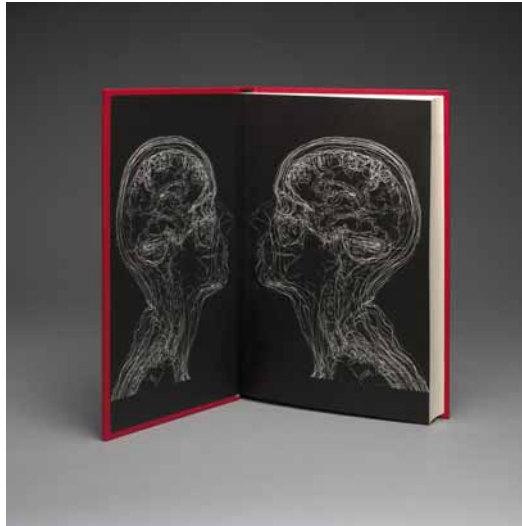


Several weeks after finishing the novel, he was in reflective mood: "The book is meant to be a modern gothic novel with echoes of the great 19th-century gothic novels. Lying on the slab, with all that electricity going on around, was pure Frankenstein. It just tied in perfectly with the way the book developed and helped reinforce it."

When finally presented with his finished portrait, Robert stared at the glass cube, transfixed at seeing the inside of his head laid bare, his brain floating before him. "I had expected not to recognise myself but it's unmistakably me. It's like looking at the equivalent of an interior monologue – very apt for a novelist. The more one looks at it the more one sees: it's impersonal and yet almost embarrassingly intimate."

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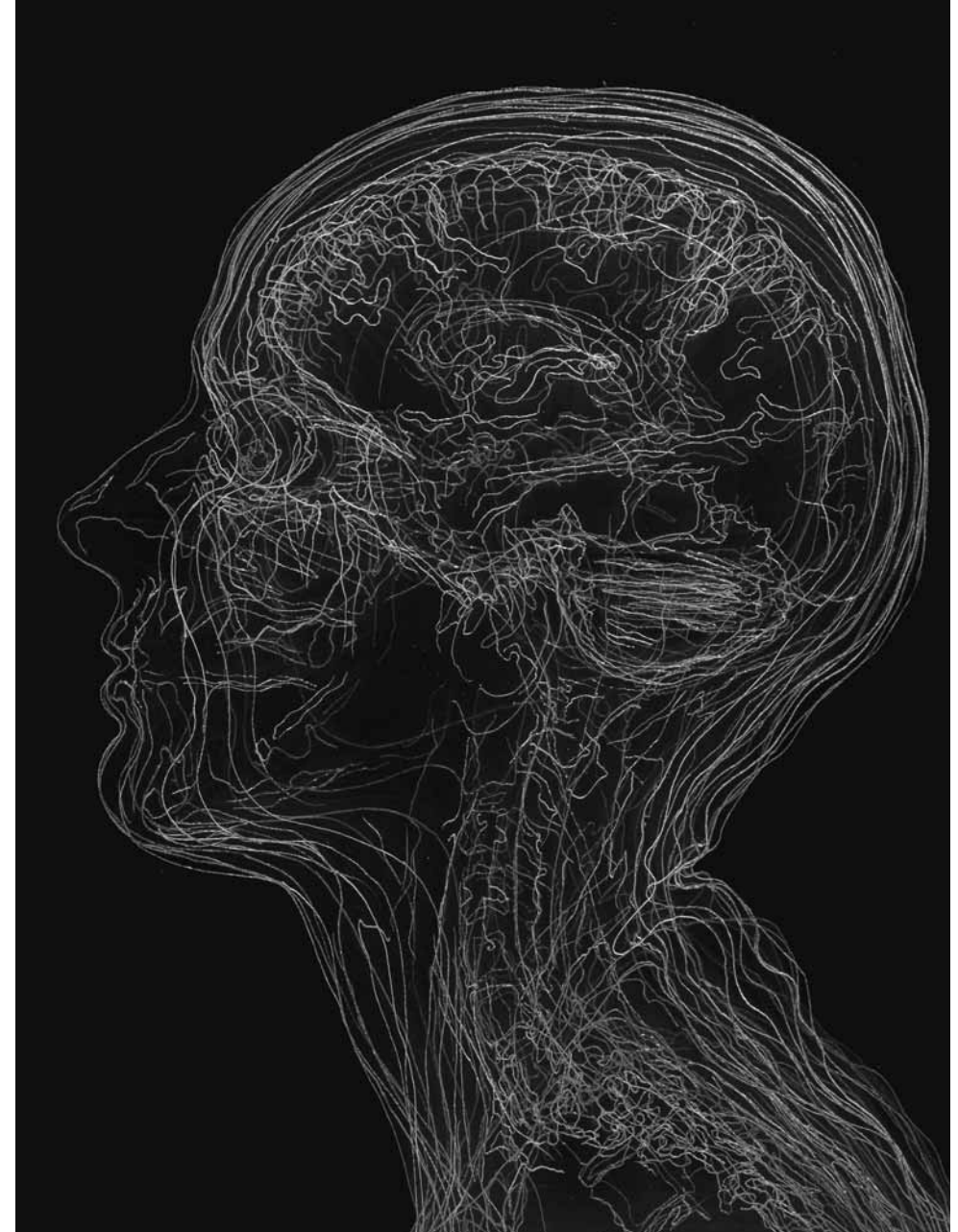
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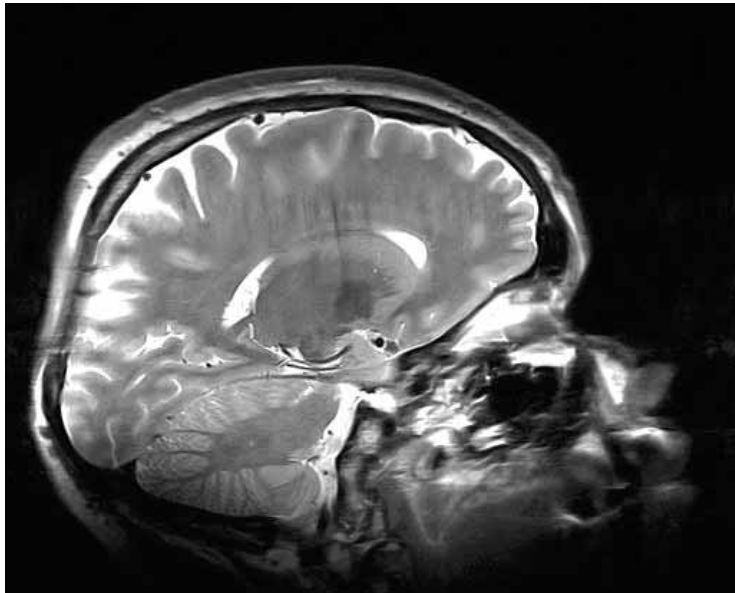
Engraved Self Portrait

Based on MRI scans of the artist carried out under the direction of Dr Stephen Golding at the John Radcliffe Hospital, Oxford

Engraving on 14 sheets of Mirogard glass 30 x 27 x 21 cm (Series of 8)

*This work is illustrated on the end pages of *The Fear Index* by Robert Harris, illustrated above*





5

Brain of the Artist

Based on MRI scans undertaken by Dr David Thomas at UCL

Engraved on 16 sheets of Mirogard glass 35 x 30 x 14 cm (series of 5)

One of the artist's scans shown above



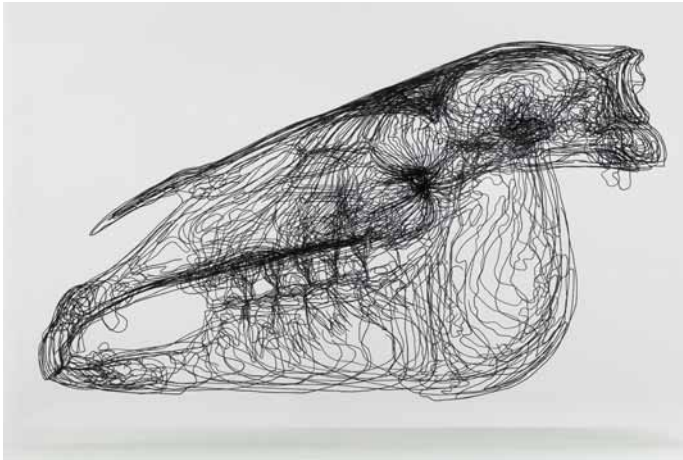
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Self Portrait 11

Based on MRI scans of the artist carried out under the direction of Dr Stephen Golding at the John Radcliffe Hospital, Oxford

Ink drawing on 14 sheets of Mirogard glass 30 x 45 x 21 cm (Series of 5)

A new sculpture of Eclipse



The artist has created a sculpture of Eclipse, probably the greatest racehorse in history, based on CT scans of his preserved skull.

Eclipse was unbeaten in the 18 races he ran in between 1769 and 1771, and when no runners were entered against him he was forced to retire. He then sired many hundreds of foals, and his bloodlines can be traced down through history. His descendants include the Duke of Wellington’s Copenhagen, and more recently Desert Orchid and Kauto Star. Remarkably,

experts believe up to 95 per cent of today’s thoroughbred racehorses can trace their family trees back to Eclipse. When Eclipse died in 1789 at the age of 25 scientists performed the first known autopsy on a horse in the UK to determine why he was so fast. Today his skeleton is preserved and studied at the Royal Veterinary College (RVC) in Hertfordshire where it continues to cause controversy. A recent study involving DNA taken from his skeleton revealed that Eclipse’s parentage has been misattributed for the past 200 years, and scientists are now calling for the rewriting of the horseracing bible, The General Stud Book of England.

The artist is indebted to Dr Renate Weller who carried out the scans of Eclipse and also to Simon Jackson, Director of Library and Information Services, RVC.



Above: Eclipse by Angela Palmer Full sized image on page 22-23

Above right: Study of Eclipse by George Stubbs c.1769

This study of Eclipse “from nature” was almost certainly made for Stubbs’s own use. It was probably a preparation for the group portrait Eclipse with William Wildman and his sons John and James in 1770 and later for the portrait Eclipse at Newmarket, with groom and jockey. This was generously donated to the Royal Veterinary College by Mr Paul Mellon, KBE.

'Eclipse first, the rest nowhere'

Eclipse was born during the solar eclipse which caused much superstitious awe on April 1st 1764. He was bred by Prince William Augustus, Duke of Cumberland, third son of George III and the vanquisher of Bonnie Prince Charlie at Culloden in 1746. Eclipse was famously ugly and bad-tempered, and narrowly escaped gelding by his new owner William Wildman, the sheep dealer who bought him at auction when he was sold in 1765 following Prince William’s death.

Wildman thought he saw something in Eclipse, however, and employed the jockey John Oakley to ride him. Oakley realised the horse was special, and rather than whipping and spurring him as was then the fashion he would just sit quietly in the saddle and let him run. Eclipse would amaze those who saw him in training, blowing heavily and galloping in his peculiar style with his rump higher than his shoulders and his nose held close to the ground. His back legs were said to be so splayed apart that you could have driven a wheelbarrow through them.

Notwithstanding all these idiosyncrasies Eclipse proved literally unbeatable. In those days races were much longer, sometimes up to 4 miles, and horses had to walk to races.

The notorious Captain Dennis O’Kelly came to hear about Eclipse and resolved to own him. He placed the famous bet at Epsom one day “Eclipse first, the rest nowhere!” (a losing deficit of more than 240 yards was defined as nowhere), and with his winnings of 650 guineas O’Kelly made a down payment, and later became the proud owner of Eclipse. The horse went on to win eighteen races between 1769 and 1770 before retiring because no one would

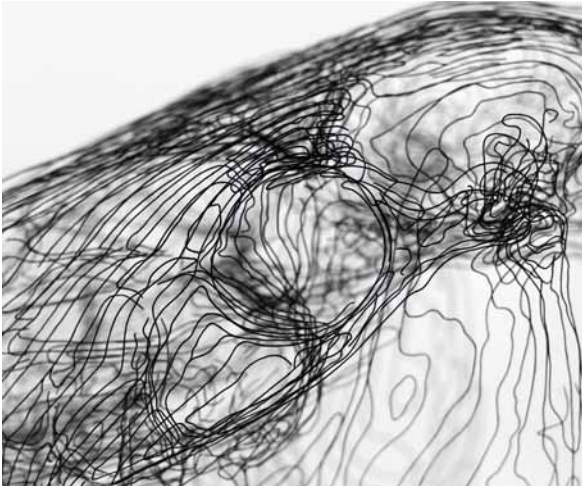


Above: print of Eclipse and groom at Newmarket by George Stubbs c.1770
Collection of The Royal Veterinary College

enter a horse against him. The enterprising O’Kelly then proceeded to put his champion to stud, and Eclipse took to his new role with alacrity. O’ Kelly was married to the brothel owner Charlotte Hayes and lived a life of increasing luxury as the 50 guineas stud fees accumulated on top of his other nefarious income streams. He had come a long way from the debtors’ prison where he first met Charlotte, and his first subsequent job as the “front legs” of a sedan chair.

Eclipse went onto sire about 500 foals, including three of the first five Derby winners, Saltram, Young Eclipse and Serjeant, and the most successful of all, Pot8os, who in turn went onto sire 172 winning sons and daughters. He was feted by princes and the general populace, and painted by the great artists of his time, from Stubbs downwards.

The eventual death of Eclipse at the age of 25 had enormous impact beyond his services to bloodstock: it led to the founding of the now world famous Royal Veterinary College. On Eclipse’s death in 1789 experts were determined to establish the physiological secrets of his success on the racecourse and a veterinary opinion was sought. However there was no veterinary school and no qualified veterinarian in the country except the Frenchman Charles Vial de Sainbel. He duly attended the corpse of Eclipse and published his post-mortem findings. St Bel’s ambition was to establish a veterinary college, and with support from Granville Penn from Odiham Agricultural Society, The Veterinary College, London, was formed in 1791, progressing from a horse infirmary to the august institution it is today.

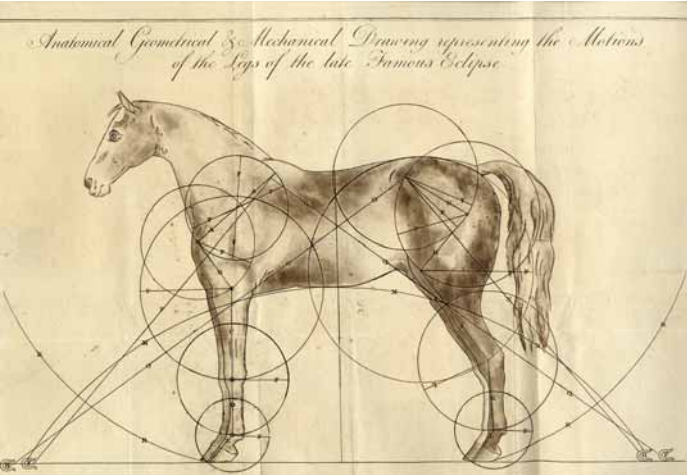


Above right: Detail of Eclipse
Full details and image on pages 22-23

The secret of Eclipse: an ordinary miracle?

Ever since Eclipse’s death there has been controversy over the authenticity of his skeleton, which is now preserved in the RVC. In a joint project spearheaded by the RVC and Cambridge University, experts analysed Eclipse’s DNA extracted from his teeth, metacarpus, humerus and tibia; they found the sequences were identical. Further analysis confirmed he was a chestnut and bone measurements correlated with those recorded by the anatomical drawings of Charles Vial de Sainbel. Armed with this data, experts then studied the lineage of Eclipse and through DNA sequencing of 15 living thoroughbreds made an extraordinary discovery: the line of Eclipse recorded in The General Stud Book of England has been misattributed – probably since 1808 - and needs to be rewritten. As Eclipse can be traced to almost every thoroughbred in the land, this will impact on the pedigrees of thousands of horses.

In a separate study led by Dr Renate Weller, The Structure and Motion group at the RVC attempted to unlock the secrets of Eclipse’s speed. Using contemporary paintings, CT scans of his skeleton and reports of his races, the team reconstructed one of Eclipse’s legs on a computer to study his movement. Researchers discovered that his legendary speed may have actually been due to his 'averageness'. In short, a great racehorse needs to be more than just quick footed - it must also be rather average. Dr Alan Wilson, who was part of the study team, said: "All the factors for speed were perfectly matched. A key ability for a fast horse is to be able to bring its legs forward quickly, which is difficult for large animals with long limbs. Eclipse was smaller than modern racehorses. Rather than being some freak of nature with incredible properties, he was actually just right in absolutely every way."



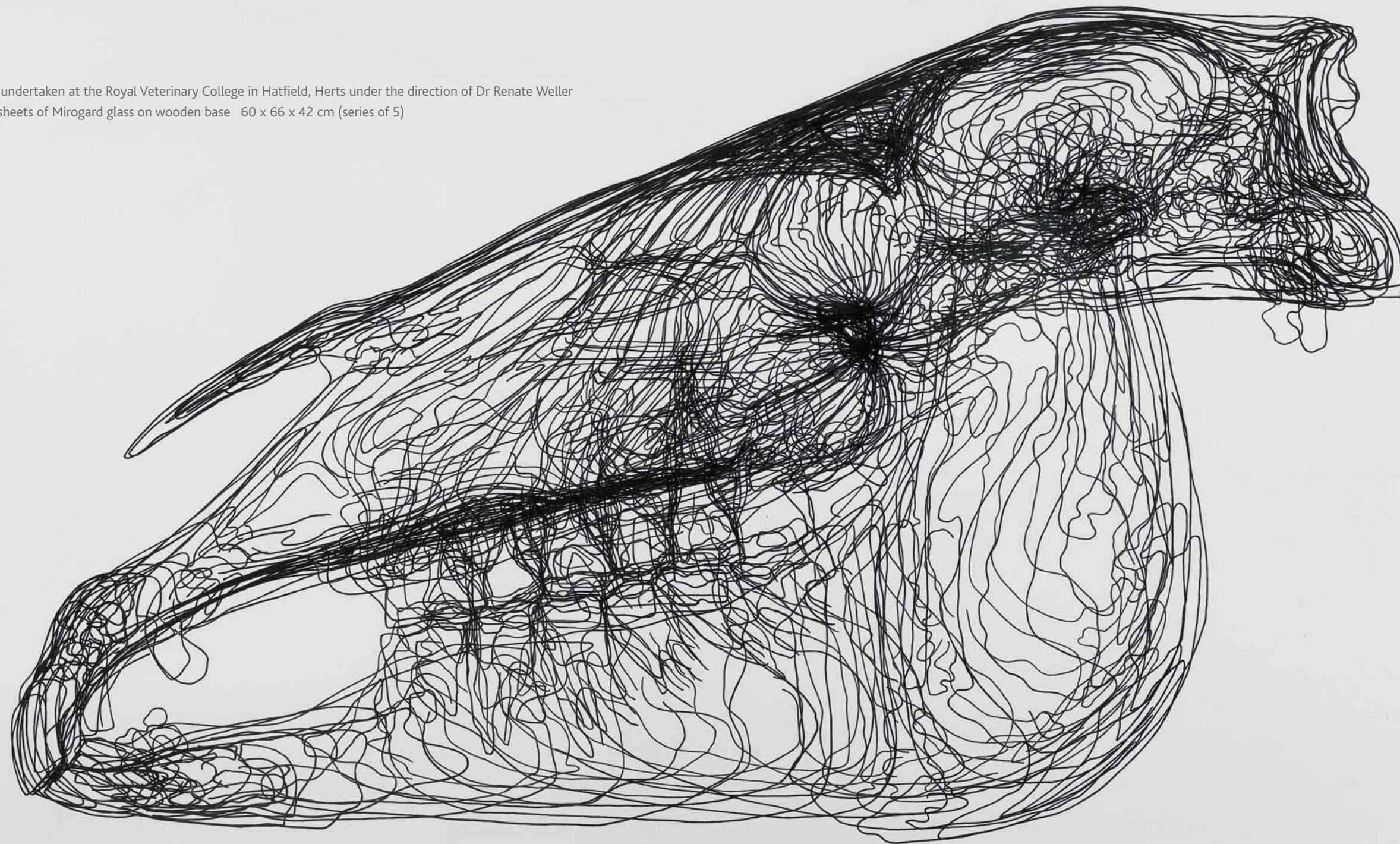
Above: Anatomical drawing of Eclipse c.1791 by Charles Vial de Sainbel
Collection of the Royal Veterinary College

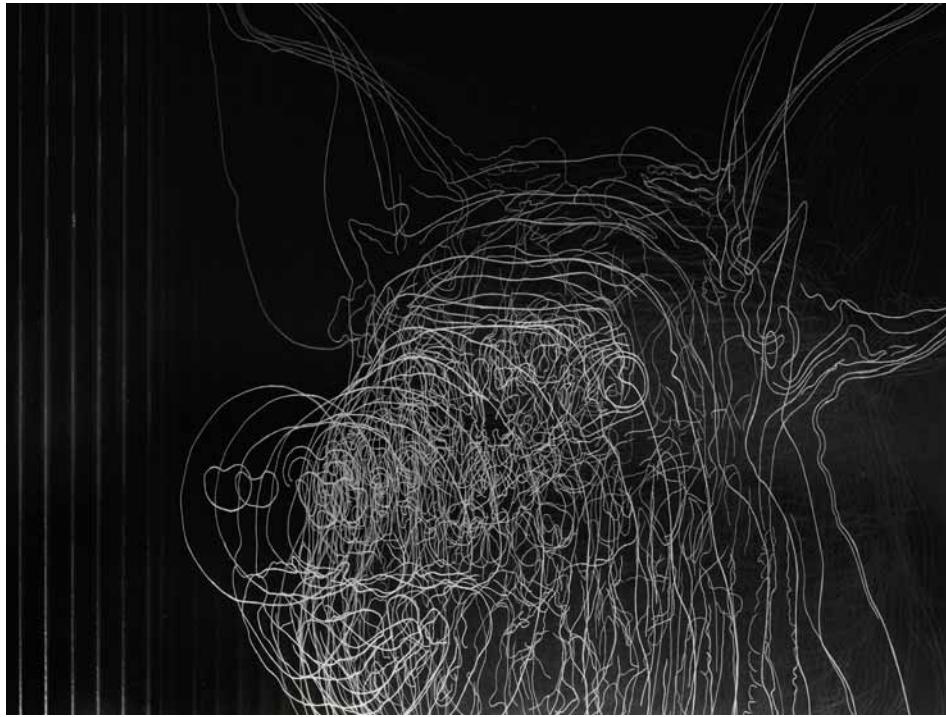
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Eclipse

Based on CT scans undertaken at the Royal Veterinary College in Hatfield, Herts under the direction of Dr Renate Weller

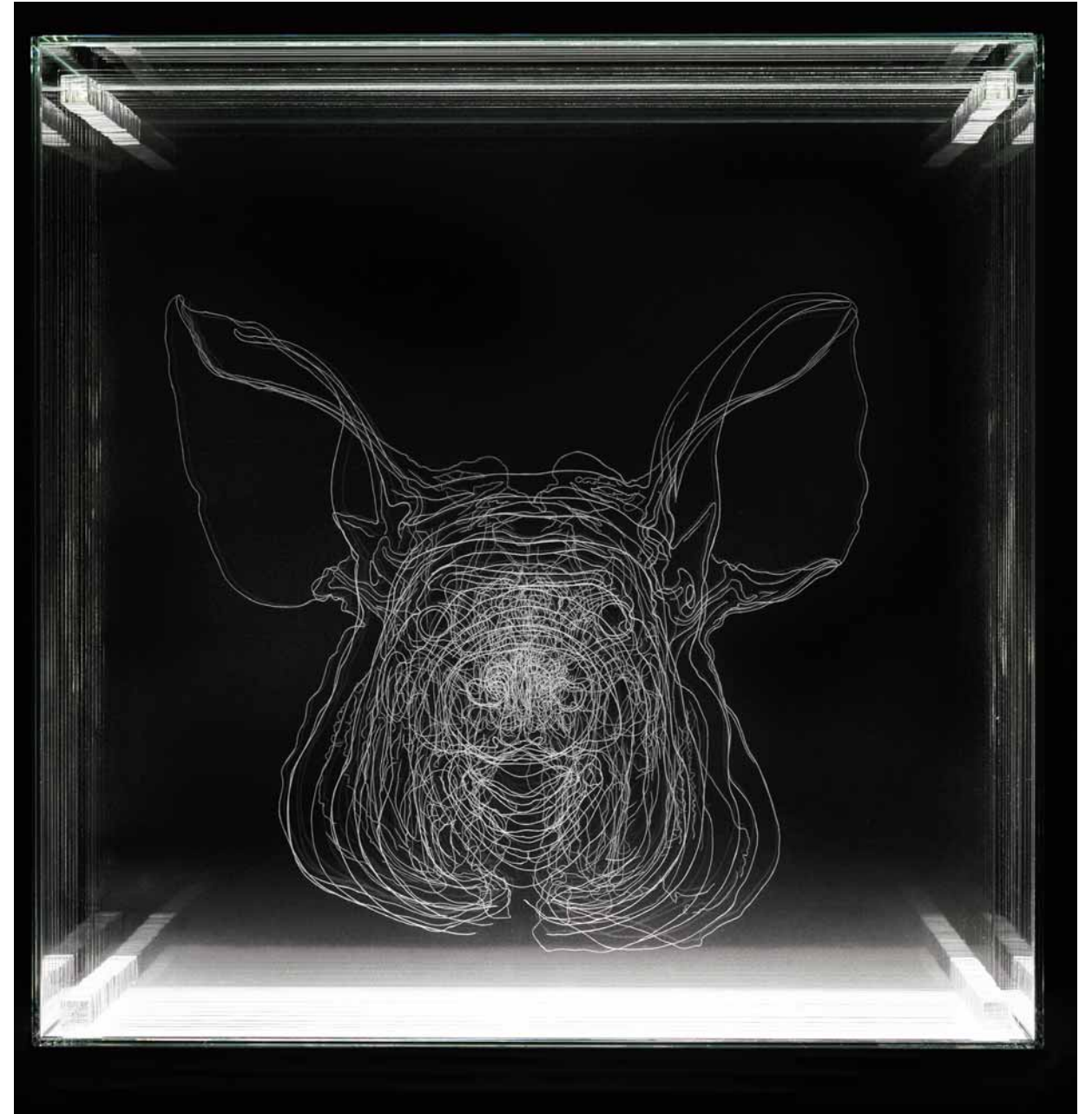
Ink drawing on 31 sheets of Mirogard glass on wooden base 60 x 66 x 42 cm (series of 5)



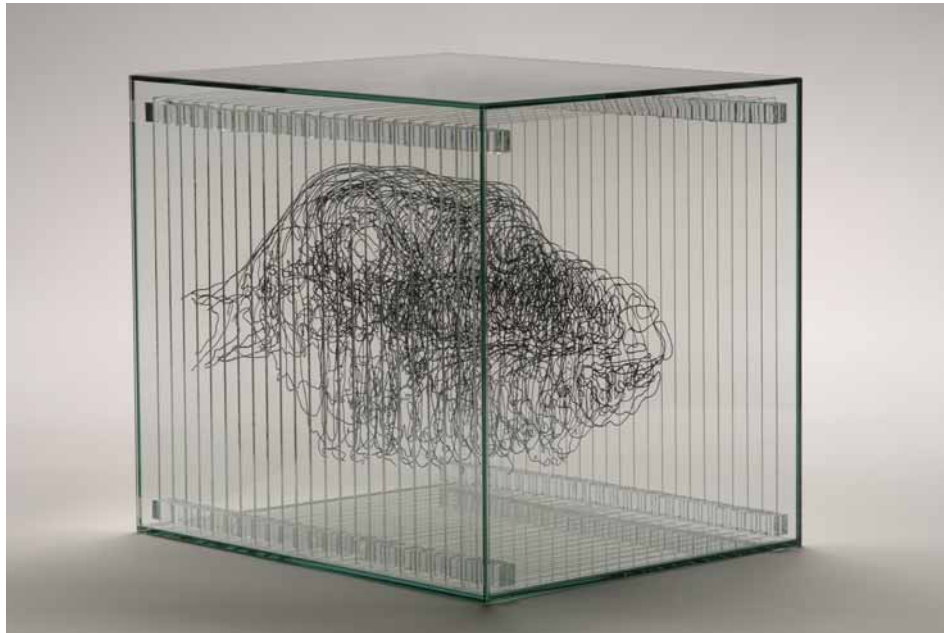


8

Oxford Pig, Landrace Duroc cross
 Supplied by Chris Pill, master butcher in Blackbird Leys, Oxford
 Engraved on 13 sheets Mirogard glass 45 x 45 x 20 cm (unique work)
detail of Oxford Pig illustrated above







10

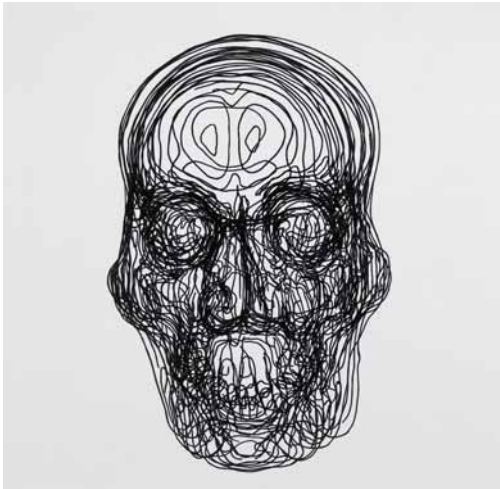
Cow Head 2

Based on CT scans undertaken at the Royal Veterinary College under the direction of Dr Renate Weller

Ink drawing on 23 sheets of Mirogard glass 30 x 27 x 34 cm (Series of 5)

alternative view illustrated above

The Mysterious Priest of Thebes



The sculpture (shown left as a detail & overleaf) depicts the head of Djedjehutyuefankh, an Egyptian mummy from the 25th Dynasty, who takes centre stage in the newly opened Egyptian Galleries of the Ashmolean Museum in Oxford. The artist created the portrait of 'Djed' - as he is known to his curators – based on CT scans taken at the city's Churchill Hospital. Last year the artist created a full size portrait of the Ashmolean's child mummy based on CT scans, and the sculpture is now on permanent display in the museum.

Djedjehutyuefankh was the Priest of Montu Lord of Thebes, and a member



of a family of Theban priests. He lived between 770 and 712 BC, about 2,780 years ago and his lengthy name means: *Says the god Thoth, 'May he live'*. As a priest, Djed served the warlike falcon-god Montu, while his father Djedeseiuefankh was a priest of Amun-Re. Djed's elaborately painted triple coffin was found, together with his mother's, buried in the hallowed ground of the temple at Deir el-Bahri built by Queen Hatshepsut 700 years earlier.

The outermost, rectangular coffin has a vaulted lid, symbolic of the sky. The posts at the coffin's four corners represent those believed to hold the sky up above the earth. Each post is inscribed with a prayer requesting eternal offerings for Djed, and surmounted by a falcon representing the sky-god Horus, son of Osiris.

On top of the lid are wooden statuettes of a jackal, the animal associated with the god Wepwawet who guarded the dead and led them to the Afterlife; and mummiform falcons, symbols of the god Sokar, counterpart of Osiris, god of the dead. The scenes painted on the lid show the sun god being towed in his sacred boat through the day, and his underworld journey after his 'death' at sunset. After passing safely through the dangers of the night, the sun is reborn at dawn.

At either end of the coffin the goddesses Isis and Nephthys mourn and protect the deceased, just as they mourned their brother Osiris. On the long sides are further guardians of Osiris, below an inscription describing what Djed did during his lifetime.

Inside the rectangular coffin are two mummy-shaped coffins, each with a human face wearing a striped wig, a beaded collar, and a beard. The innermost coffin holds Djed's mummy, covered with a bead network. The surface of the coffin is inscribed with prayers for his well-being in the next world. The jackal-headed god of mummification, Anubis, appears in the paintings, along with the Four Sons of Horus who protected the vital organs of the deceased. On the chest and feet, the goddess Nut, with her wings outspread, guards the mummy.

Djed recently underwent a CT scan at The Churchill Hospital in Oxford which revealed him to be a mature adult measuring about 5ft 2in. Amulets were found at the front of his throat, just above his adam's apple and stone coverings were discovered over his eyes to prevent his eyelids from sinking into his head. Radiologists could not find any evidence of a defect in the skull to suggest the use of a brain hook for extraction – a common procedure in mummification. Indeed desiccated brain tissue remains in the skull cavity,

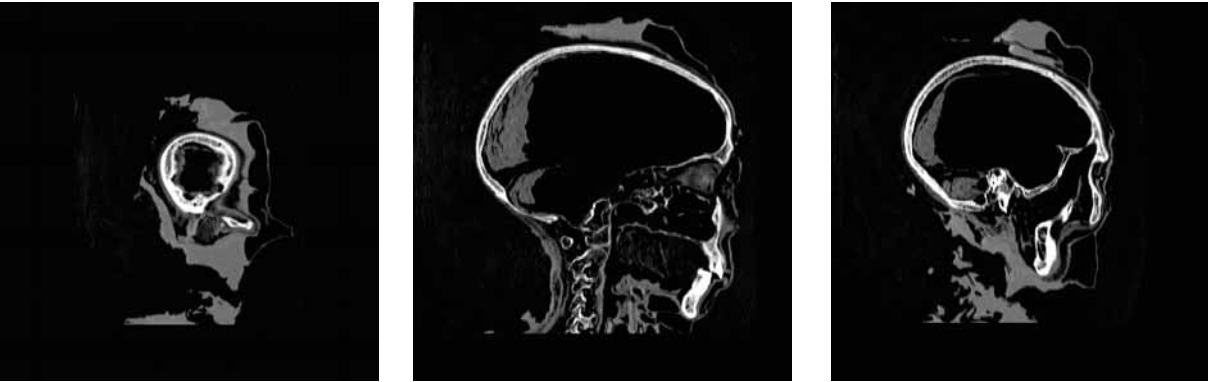


Above left: Detail of The Ashmolean Theban Priest
Full details and image on pages 32-33

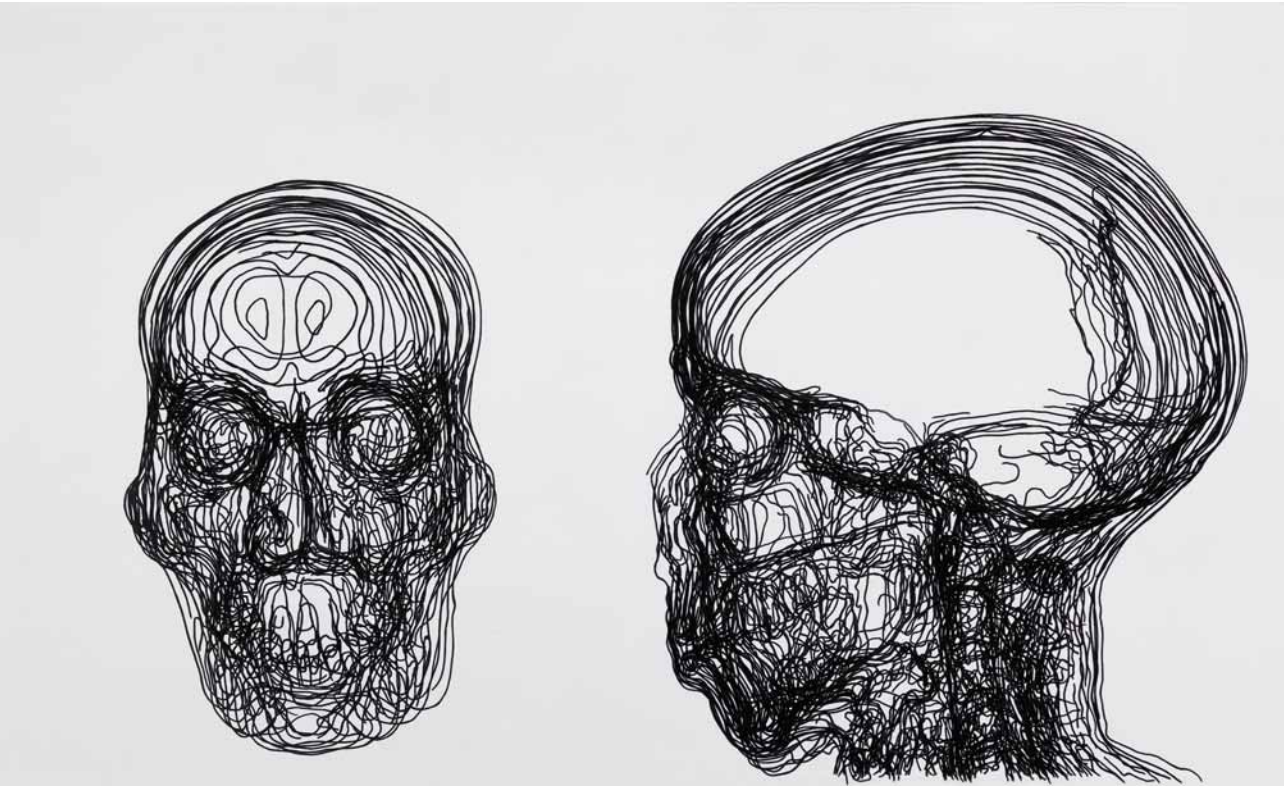
Above right: Djedjehutyuefankh

Right: Djed being scanned
at the Churchill Hospital, Oxford

as can be seen in the artist’s glass portrait of Djed. His mouth appeared to contain ‘some rolled up cloth-like material’ as a possible replacement for his tongue. However the greatest surprise to experts was the absence of all his internal organs which appeared to have been removed prior to mummification including his heart; the contents of his chest and abdomen have been removed and filled with a packing material resembling sand or clay. This seemed unusual as the heart was normally returned after being dried out so that it could be weighed against the feather of truth. If the heart was light the person could travel on to the afterlife. If the heart was heavy a monster called a devourer would eat it. Further scrutiny of the scans however has shown an object lying on the legs of the priest resembling a linen wrapping, leading to speculation that it could contain the missing heart of Djed.



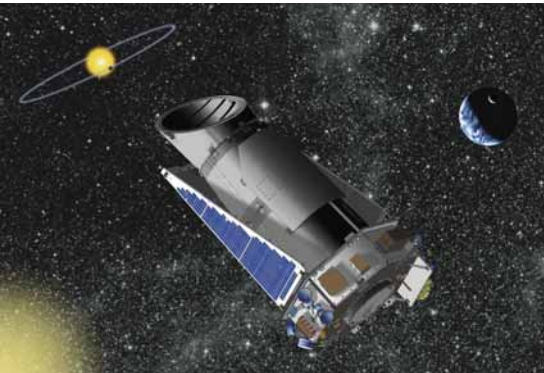
The cause of Djed’s death meanwhile remains a mystery: there was no sign of broken bones and no evidence of significant osteoarthritis affecting his major joints; the discs in his lower spine appeared well preserved and an old fracture in his hip was dismissed as a typical occurrence in adolescence. Overall, radiologists found his bones remain normally articulated as in life. As experts continue in their struggle to unlock the mysteries of this Theban priest, it would seem the god Thoth’s exhortation for Djed holds as much weight today as it did almost 3000 years ago.



12
 Red cabbage
 Engraved on 11 sheets of Mirogard glass.
 30 x 27.5 x 10 cm (series of 5)



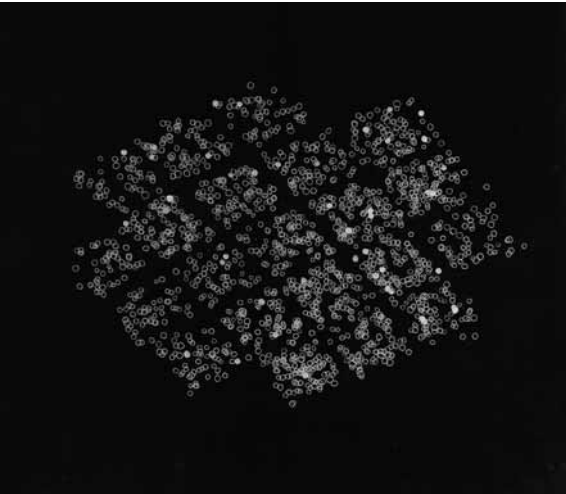
Searching for Goldilocks



It was last summer that I first had the idea of recreating the view through the Kepler telescope, the instrument at the centre of NASA's mission to search for habitable planets. I was lucky enough to join about 200 of the world's leading scientists at Google's annual SciFoo conference at their headquarters in California to which, in the interests of sparking creative collaboration, a handful of artists embracing science get a hot ticket. Space was a recurring theme at the conference, and with my fascination for mapping I realised that the mystery of the universe could

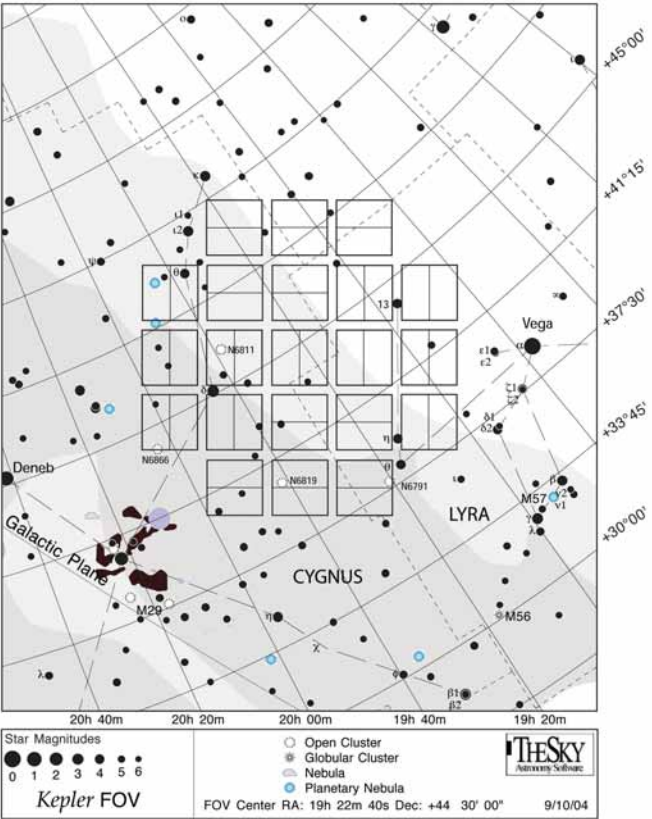
be an interesting new theme to explore – could I map space? One of the delegates was Dr Chris Lintott, an astrophysicist from Oxford University, and we resolved to get together to discuss ideas in his laboratory. Having seen the Egyptian child mummy whose body I had recreated in glass at the Ashmolean Museum, he immediately visualised possibilities. The fact that the technique I use results in the illusion of sculpted objects 'floating in space', made it, he felt, ideally suited to the representation of the cosmos.

One of Dr Lintott's suggestions was to focus on NASA's Kepler Mission which is concerned with the identification of potentially habitable planets orbiting Sun-like stars far from our own solar system. The 'eye' of the Kepler project is a telescope installed in an Earth-trailing satellite. Kepler's planet-finding scheme works by using a



photometer—a highly sensitive light-measuring apparatus—mounted in the telescope to detect the regular reduction in a star's apparent brightness caused by an orbiting planet repeatedly passing or 'transiting' in front of it. The telescope has been surveying a small patch of space in the region of the constellations of Cygnus and Lyra for the past three years. This area was carefully chosen to fulfil a number of important criteria: it is viewable year-round without obstruction (essential to the mission's data-gathering scheme), it is off the ecliptic plane (the plane of the Sun's apparent "path" through the sky, as seen from Earth) so that the instrument can observe it without being dazzled by the light of the Sun, and it combines a richness in stars with a position off the galactic plane (the plane of the Milky Way), thereby providing a window into an interesting region of space, unconfused by the Milky Way's menagerie of bright, local objects.

Dr Lintott explained that despite their enormously profound significance, Kepler's discoveries remain little-known among the world at large. At the time or writing, within the tiny window of space it surveys—from our perspective here on Earth, comparable to the area of one's hand held at arm's length—Kepler has so far identified 2,321 potential planets (or 'planet candidates') orbiting 1,790 unique host stars. Excitingly, observations suggest that more than 40 of these could have Earth-like qualities.

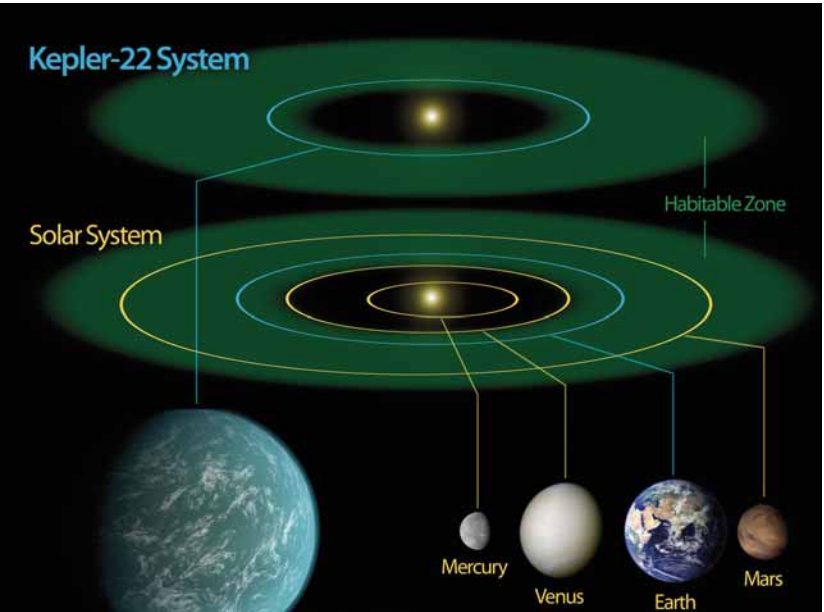


Above left: Kepler Telescope (artist's impression)
Image courtesy of NASA

Lower right: Searching for Goldilocks
Full image and details on pages 40-41

Above: location of the area charted by the Kepler Telescope
Image courtesy of NASA

These so-called ‘Goldilocks zone’, or ‘habitable zone’ planet candidates orbit at distances from their host stars which potentially give them temperatures within the right range for liquid water to be present on their surfaces. Much like a bowl of Little Bear’s porridge, a Goldilocks zone planet is ‘just right’; neither too hot, nor too cold (or as another scientist put it, a Goldilocks zone planet is “the sort of planet with the water to make a cup of tea on, without fear of frostbite or incineration.”). Kepler’s reach is extraordinary; the telescope is capable detecting planets orbiting stars which are 4,300 light years distant from our own solar system. A light year is the distance light travels in free-space in one year; approximately 9,461 billion kilometres. Though easily described in the abstract, the reality of such a distance is close to incomprehensible. The trip from the Earth to the Sun is about 150 million kilometres; if this distance were the length of your index finger, a light year would be nearly 6.5 kilometres. On the same scale, 4,300 light years is more than twice the diameter of the Earth.



We developed the idea of representing the view through the telescope on 18 sheets of glass. Each successive sheet would show the location of the stars which Kepler has identified as likely planetary hosts in a 250 light year deep section of space; the first sheet (i.e. that nearest to an observer standing at the front of the sculpture) corresponding to the first 250 light year ‘slice’ measured from Earth, and so on. The possibility of producing a

‘virtual cube of space’ which allowed the observer to explore not only the view of distant planet-hosting stars as seen by the Kepler telescope, but also the Kepler telescope as seen by distant stars—in other words, looking back from 4,300 light years into the eye of the instrument—was, to me, extraordinarily exciting. I left the lab armed with a chart listing the locations of Kepler’s current planet candidates and their starry hosts: the information I needed to create the sculpture.

However, translating the data from the chart into a useable form proved a ferocious challenge; I knew accuracy would be key to the work and for weeks the project was perilously close to missing the deadline for the exhibition. Enter to the rescue Dr Alexy Karenowska, a brilliant young physicist from Magdalen College, Oxford. Together, we were able to produce a three-dimensional computer model of the sculpture, and to devise a scheme for transforming it into glass.

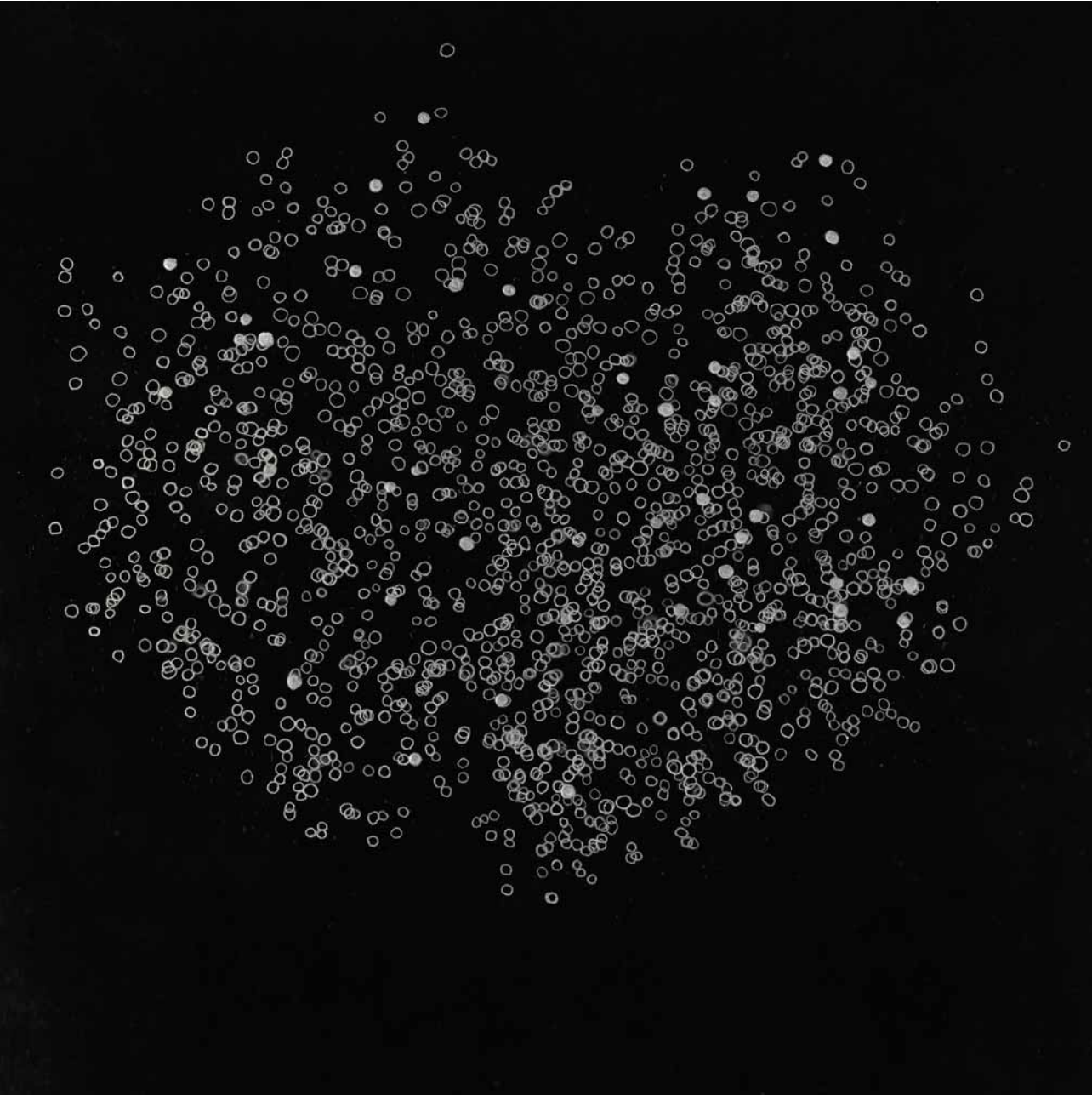
In the finished sculpture, stars identified by the Kepler mission as having orbiting planet candidates are represented by open engraved circles. Those with a touch of the extra-special—the stars associated with Goldilocks zone planet candidates—are shown as solid circles.

The photometer inside the Kepler satellite is made up of an array of 42 light sensitive elements arranged in closely-spaced pairs. As a result, the field of view surveyed by the mission is not a solid ‘block’ of space, but a patchwork of squares. This structure imprints a pattern on the map of observable stars so that viewing the sculpture head-on, we have the feel of looking into the beauty of space—resplendent in its mystery—through the compound eye of some extraordinary man-made insect.

Catalogue notes by Angela Palmer with wise counsel from Dr Alexy Karenowska

Above: Chart of the Kepler 22 System and its habitable zone
Image courtesy of NASA

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Searching for Goldilocks
The installation is a collaboration with Dr Chris Lintott, astrophysicist & Dr Alexy Karenowska, physicist, both from Oxford University
Engraving on 18 sheets of Mirogard glass, each representing 250 light years Sheet size 34.5 x 29.5 cm (Series of 5)



ANGELA PALMER

Scottish Born 1957

EDUCATION

2005-2007 MA, Royal College of Art, London
2002-2005 Bachelor of Fine Art, The Ruskin School of Drawing and Fine Art , University of Oxford
Awarded Scholarship and Fitzgerald Prize

EXHIBITIONS & AWARDS

2011 Egyptian Galleries, The Ashmolean Museum, Oxford (permanent collection)
Unwrapped: The Story of a Child Mummy, solo exhibition, Cast Gallery, Ashmolean Museum, Oxford
SCOPE Basel, Switzerland
2010 *Ghost Forest*, Museum of Natural History and Pitt Rivers, Oxford (until July 31, 2012)
2009 *Ghost Forest*,Thorvaldsens Plads, Copenhagen, Denmark (7-18 December)
Ghost Forest,Trafalgar Square, London (16-22 November)
Breathing In, Wellcome Collection, London
2008 *Unravelled*, solo exhibition, Waterhouse & Dodd, London
Art Duabi, UAE
AIFAF Palm Beach, Florida (also 2009)
Art Hamptons, New York
2007 ArtParis AbuDhabi Fair, Abu-Dhabi (also 2008)
Art London, Chelsea (also in 2011)
London Art Fair (also 2008-9)
‘Royal College of Art Society and Thames and Hudson Award’

2007 Royal College of Art
Winner, Polly Campbell Award, Jerwood Space, London
Inside Out, Hunterian Museum at The Royal College of Surgeons
2006 *Fleming Collection*, Berkeley Street, London
Talbot Rice Gallery, University of Edinburgh
Hatton Gallery, University of Newcastle
2005 *Summer Exhibition*, Royal Academy
Solo Show, Bourne Fine Art, Edinburgh
2004 *Winchester Festival of Science and Art*
Modern Art Oxford, (Ruskin Show)
Director’s Chair Exhibition, Open Eye Gallery, Edinburgh
2003 *Group Show*, Fine Art Society, London
Medical Sciences Department, University of Oxford

COLLECTIONS

Ashmolean Museum, Oxford
Wellcome Trust Collection, London
Laurence Graff
Kenneth Clark Art Collection, Pembroke College, University of Oxford
Exeter College, University of Oxford
Institute of Medical Sciences, Aberdeen University
Royal Bank of Scotland

PRESS COVERAGE

Coverage relating the Ashmolean display:
Unwrapped: the story of a child mummy at the Ashmolean Museum, Richard Dorment, Daily Telegraph, November 29, 2011
Theresa Thompson, The Oxford Times, December 30, 2011
Adrian Hamilton, The Independent, November 28, 2011
Nicol Dynes, Il Sole 24 Ore, November 23, 2011
Michael Philo, Artlyst, November 24, 2011

Coverage relating to Ghost Forest:
Where is she? Gone to Ghana to get rare trees, FT Weekend magazine:
14/15 November 2009
The Times: Ken Russell on London’s Ghost Forest
13 November 2009
Bringing a rainforest to Trafalgar Square, Financial Times
9 October 2009
BBC: *New images of ‘ghost forest’ art*
9 October 2009

Coverage for the Wellcome Trust exhibition
BBC: *Breathing In* audio slideshow
4 November 2009

Coverage for Unravelled at Waterhouse & Dodd
Ghost toddler from ancient Egypt on show as art, Daily Telegraph:
23 May 2008

Other notable articles:
Bring me the head of Robert Harris, Financial Times Weekend Magazine, October, 2011
The Q and A: Angela Palmer, Artist, The Economist’s Intelligent Life Magazine, January 2011
“The cleanest place on earth - and the dirtiest”
The Guardian, July 9th 2007
“New world of interiors, when science meets art”
The Times, May 26th 2007
Cover, The Lancet magazine, December 2006

In addition to the many experts and specialists mentioned in the catalogue, the artist would also like to acknowledge the following in connection with the project on Djeddjehutyieufankh: Dr Christopher Brown, Director, The Ashmolean; Dr Liam McNamara, Assistant Keeper for Ancient Egypt and Sudan, The Ashmolean; Dr Steven Turnbull, Dr Anthony McIntyre and Dr Zoe Traill at the Churchill Hospital and Dr Pieter Pretorius at the John Radcliffe Hospital. And finally thanks to Antonia Russell-Clark, my assistant Alison Munby and my family, all of whom are, like Goldilocks, perfect in every way.



Angela Palmer photographed with a *Ghost Forest* tree
Image courtesy of the photographer, Sue Macpherson

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