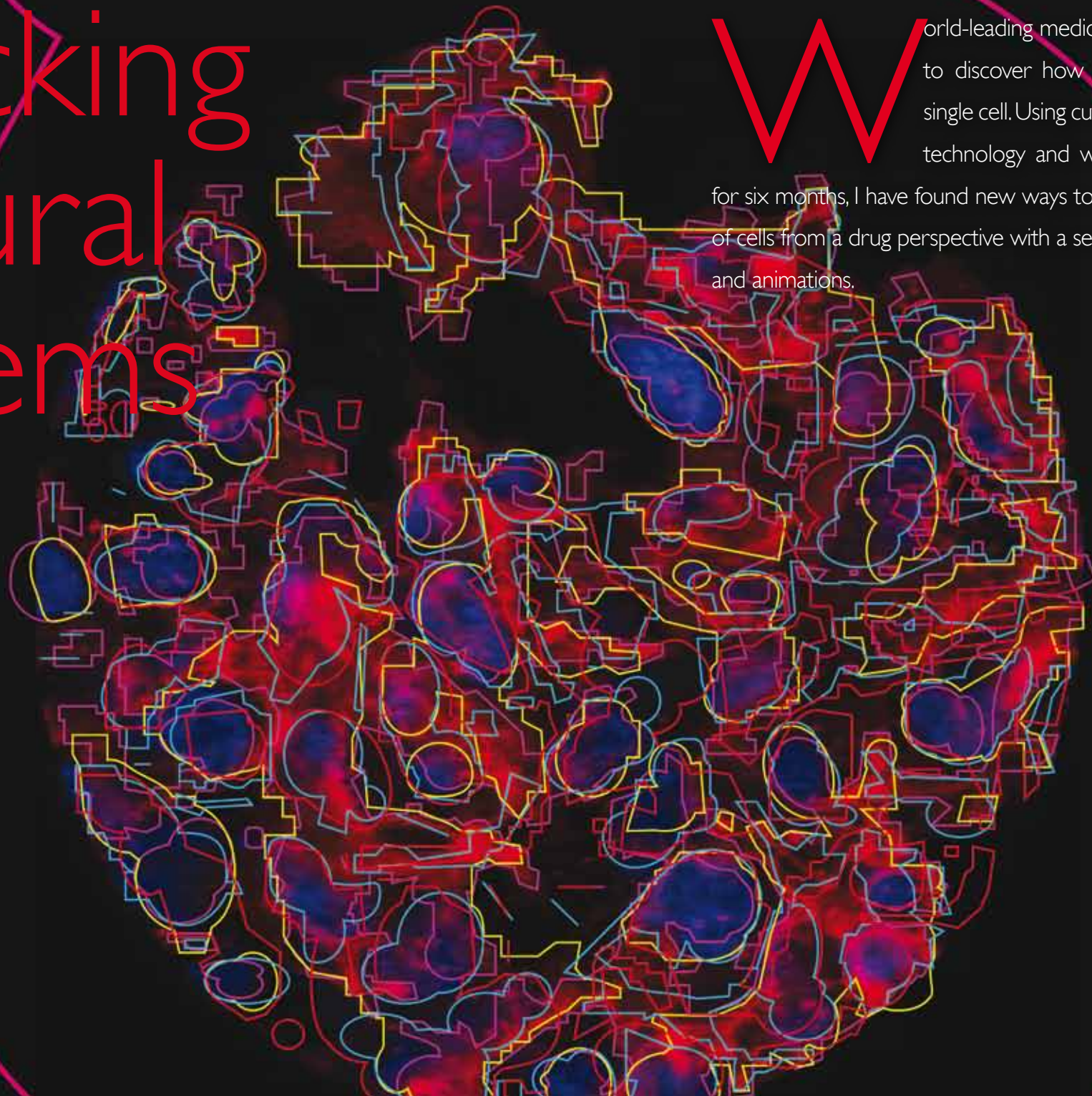


Hijacking Natural Systems

Jo Berry

World-leading medical research is ongoing to discover how medicines work in a single cell. Using cutting edge microscope technology and working with scientists for six months, I have found new ways to represent the activity of cells from a drug perspective with a series of digital drawings and animations.



The collaboration between art and science might be considered as two worlds colliding, yet there is much inspiration for an artist to be found working in that environment and having access to the latest scientific and medical techniques.

The aim of this project was to find new ways to represent the activity of cells from a drugs perspective to the public, generating digital design drawings from which I created artwork and animations for a city-wide exhibition in Derby in July.

For six months, I spent one day a week working as a novice research scientist in the Cell Signalling Research Group at the School of Biomedical Sciences, at Nottingham University, working on research being undertaken into "hunger hormones" and their receptors, which determine how hungry we feel.

I was introduced to the scientific process behind hypotheses-driven research into pharmacology, and gained hands-on experience of fluorescent-imaging experiments and production of cell images for analysis.

Working with Dr Nicholas Holliday and Tim Self, we designed a project based around their ongoing research into the stomach peptide ghrelin, which is unique as a hormone because it stimulates our appetite.

The scientific aims of the project were first to demonstrate that ghrelin receptor trafficking within cells (specifically its "internalisation" from the cell surface) could be quantified, and used to derive the pharmacology of different types of ghrelin receptor drugs.

Secondly we identified and characterised a fluorescent agonist drug for the ghrelin receptor, and were thus able to study the internalisation and colocalisation of this drug and the receptor simultaneously, using confocal microscopy.

I experienced a full range of imaging techniques - to measure receptor signalling (fluorescent dyes that

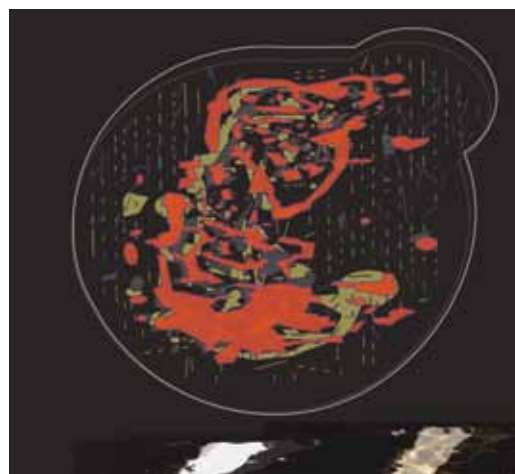
sense intracellular calcium), and to image and co-localise receptors, fluorescent ligands and markers for different intracellular compartments.

Using, amongst others, the Zeiss LSM510 and 710 microscopes, I observed the differences between traditional confocal microscopy and automated imaging systems, and had the opportunity to try advanced imaging methods such as total internal reflection (TIRF) microscopy, and the use of more physiological cell systems (human neutrophils).

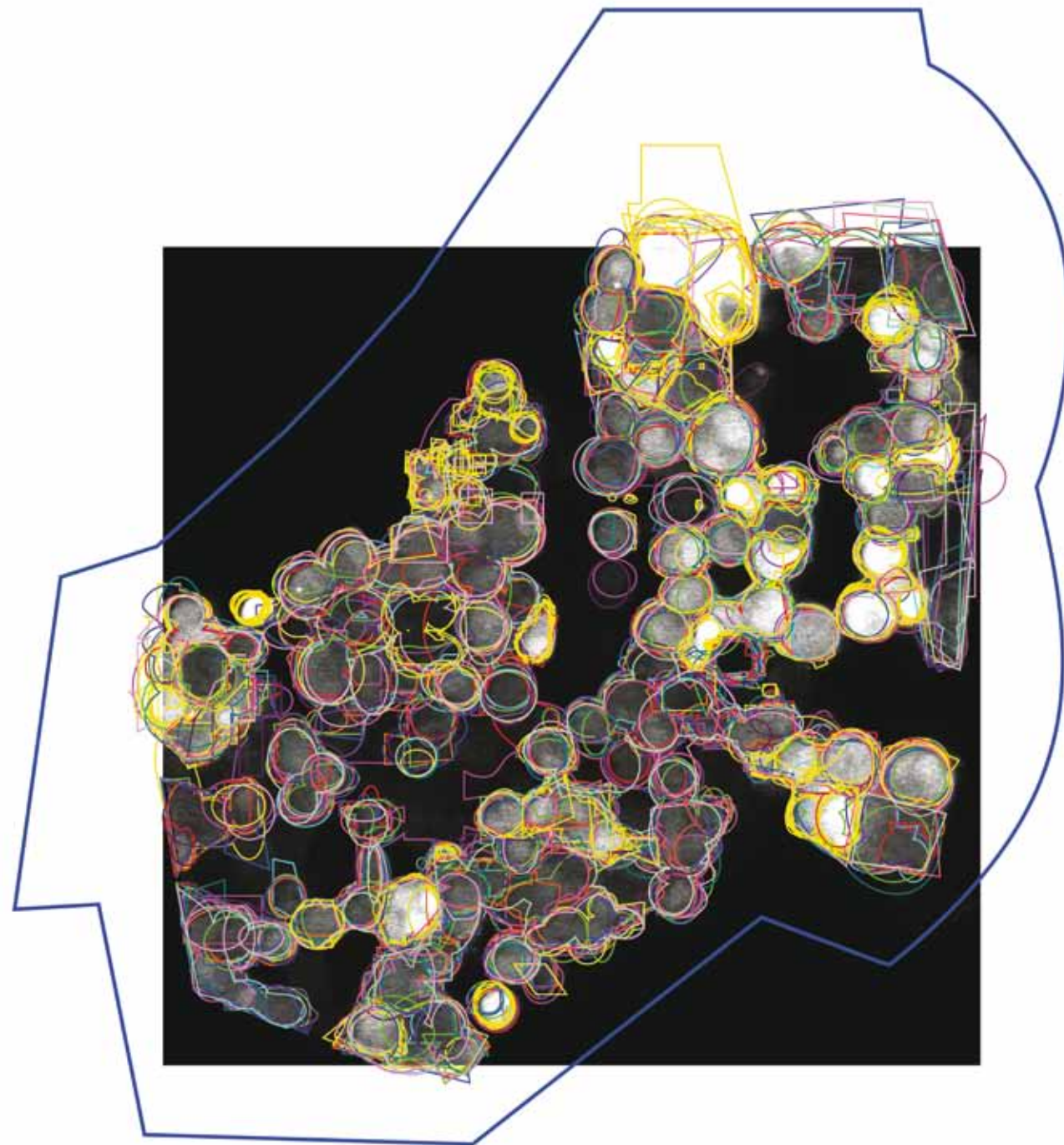
Working as a research scientist was the total opposite of my work as an artist and took me to an entirely different level of working and well out of my comfort zone.

I took the research back to my studio to create a series of layered digital drawings and animations, working with the same Zeiss Software that the scientists used, but in a different way to create new visual outcomes, as I was looking at the imagery from a completely different perspective.

Live cell imagery animations were sped up and slowed down, cell images were split, images were layered on top of one another and the source material manipulated to project 3D views, stereo images and stereo movies.



GHRP6 Rho-Fluorescent Agonist Internalisation: Here I used HEK293 (Human Embryonic Kidney Cells) cells to look at a new fluorescent tag receptor which brightly glows and picks up lots of movement in the cells as the receptor internalises and colocalises (attaches). Stills of the cells reaction were taken over a period 5, 10 and 15 minutes. I then used the original digital files as stills to create this intriguing image.



Calcium signalling: Here I used HEK293 (Human Embryonic Kidney Cells) cells to look at fat receptors. Ghrelin was added and the cells reaction was filmed over a period of 5 minutes. I then used Zeiss Software to create stills from this black and white movie. At least 8 layers were taken from this very short movie and I tried to capture in the design drawing the intricate movement of this remarkably beautiful film.

The drawing was then simplified into four layers in order to emit the correct light for the lightbox. I did not want the work to be literal representations of cells, I wanted them to be inspired by them.

The next stage was to create a series of laser cut, layered light boxes using LED lighting. Taking something from a different specialism and making it into art is a fascinating process; life under a microscope opens up a whole new world.

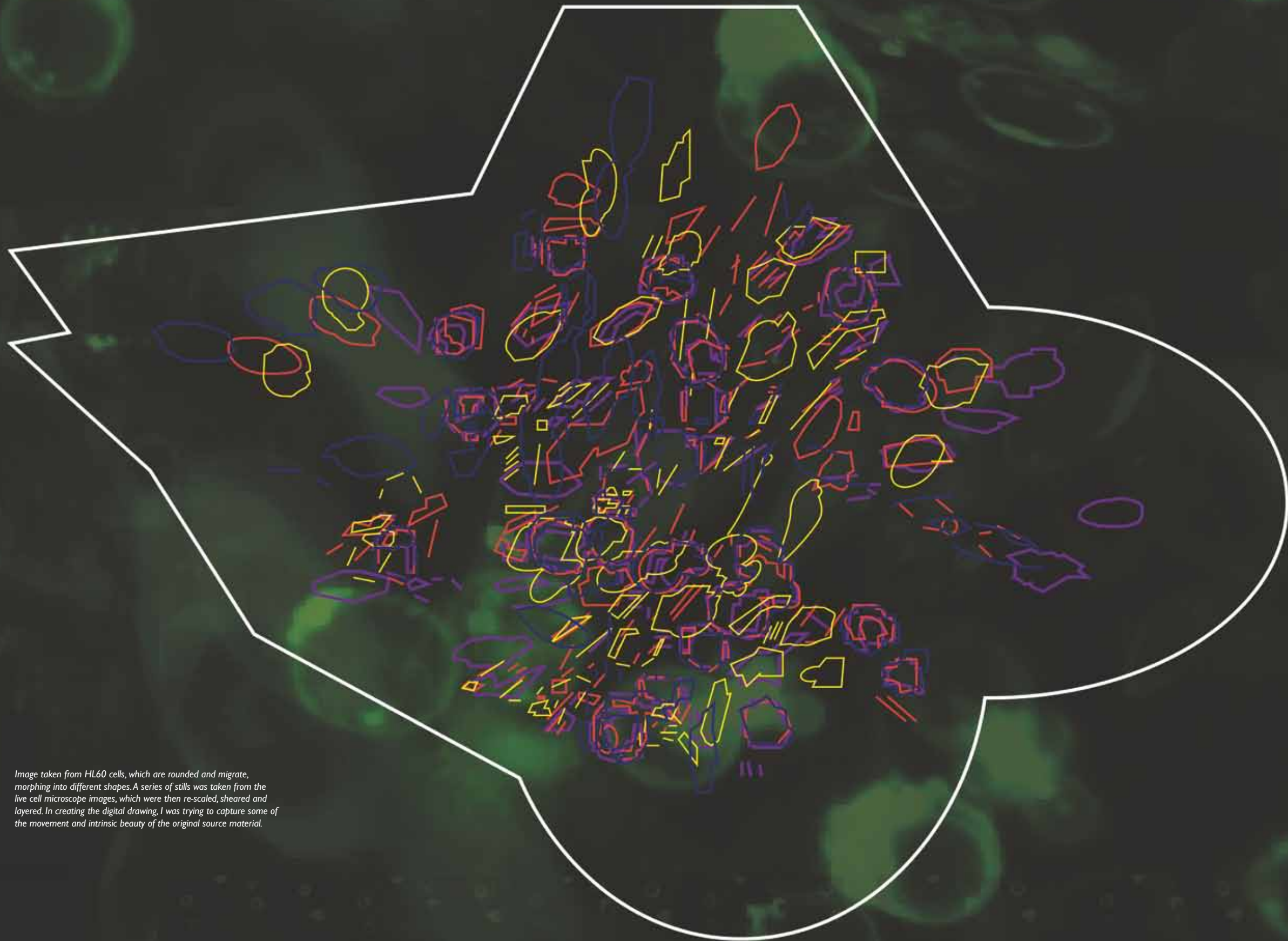
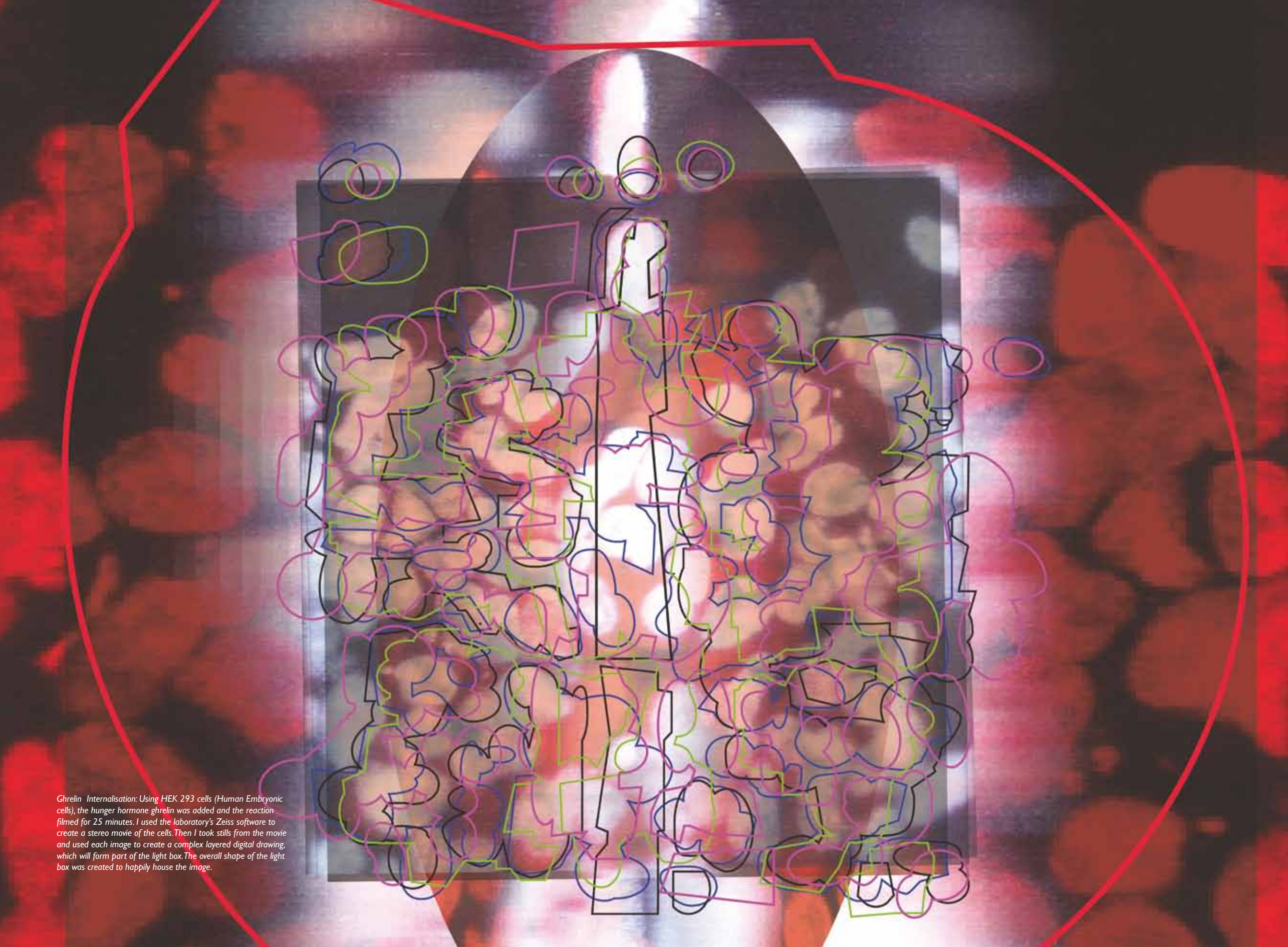
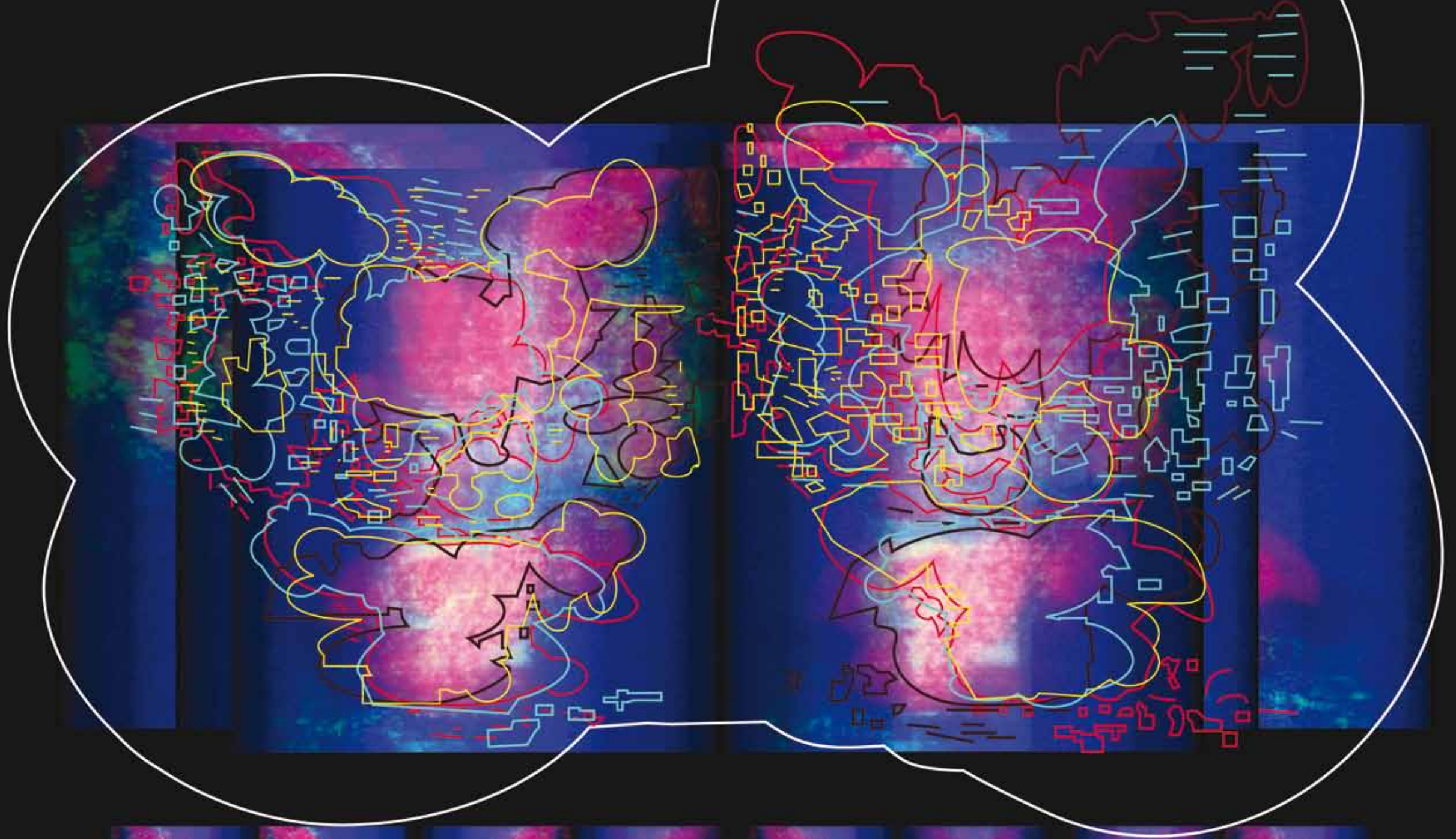


Image taken from HL60 cells, which are rounded and migrate, morphing into different shapes. A series of stills was taken from the live cell microscope images, which were then re-scaled, sheared and layered. In creating the digital drawing, I was trying to capture some of the movement and intrinsic beauty of the original source material.

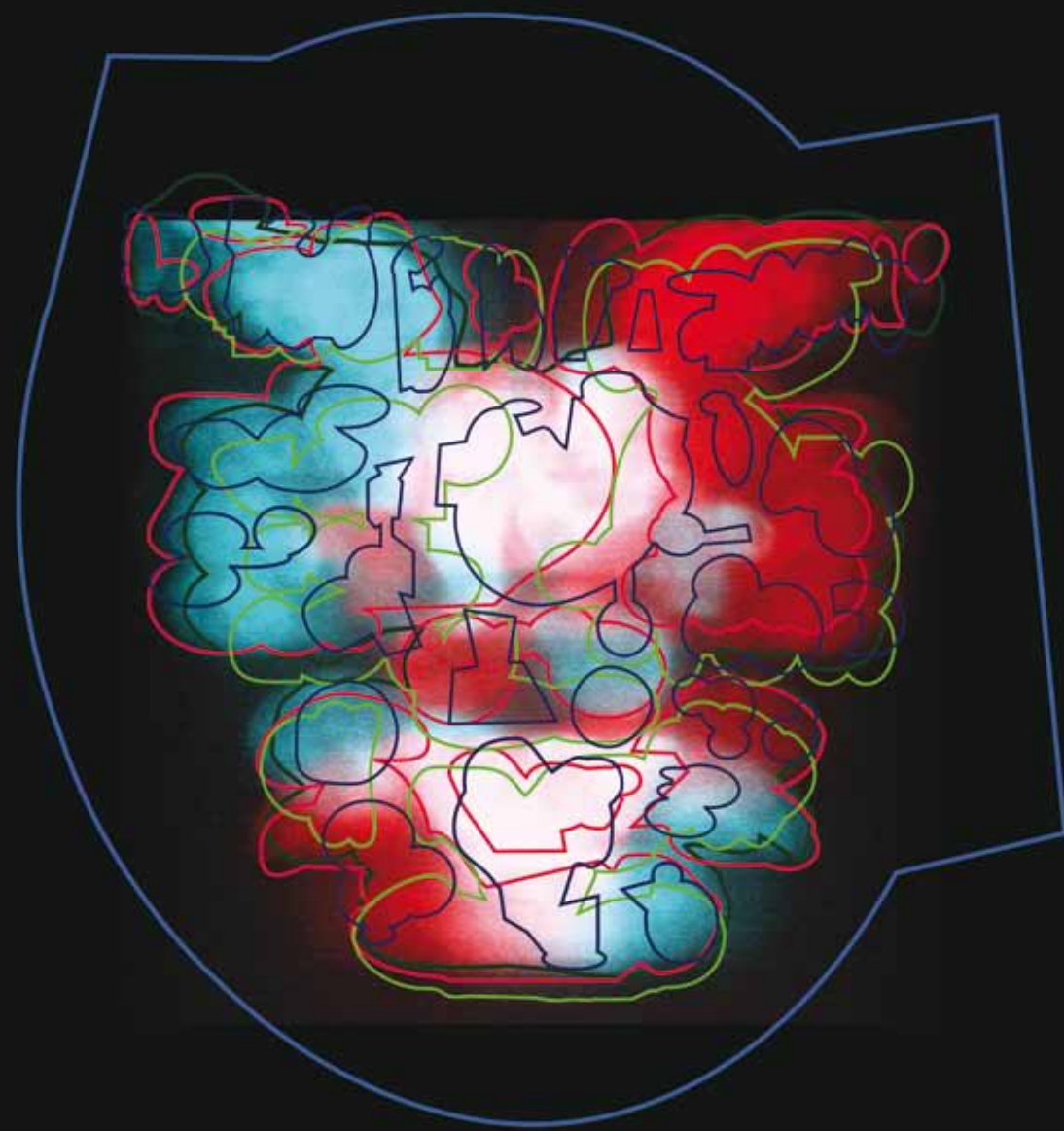


Ghrelin Internalisation: Using HEK 293 cells (Human Embryonic cells), the hunger hormone ghrelin was added and the reaction filmed for 25 minutes. I used the laboratory's Zeiss software to create a stereo movie of the cells. Then I took stills from the movie and used each image to create a complex layered digital drawing, which will form part of the light box. The overall shape of the light box was created to happily house the image.



Ghrelin Internalisation Using HEK293 cells (Human Embryonic Kidney cells), the hunger hormone ghrelin was added and the reaction filmed for 20 minutes. I used the laboratory's Zeiss software to create a stereo version of the cells. I took stills from the 20 minute movie and used each image to create a layered digital drawing, which will form part of a light box. I adapted the overall shape of the lightbox to create a soft curvaceous shape reminiscent of butterfly wings.

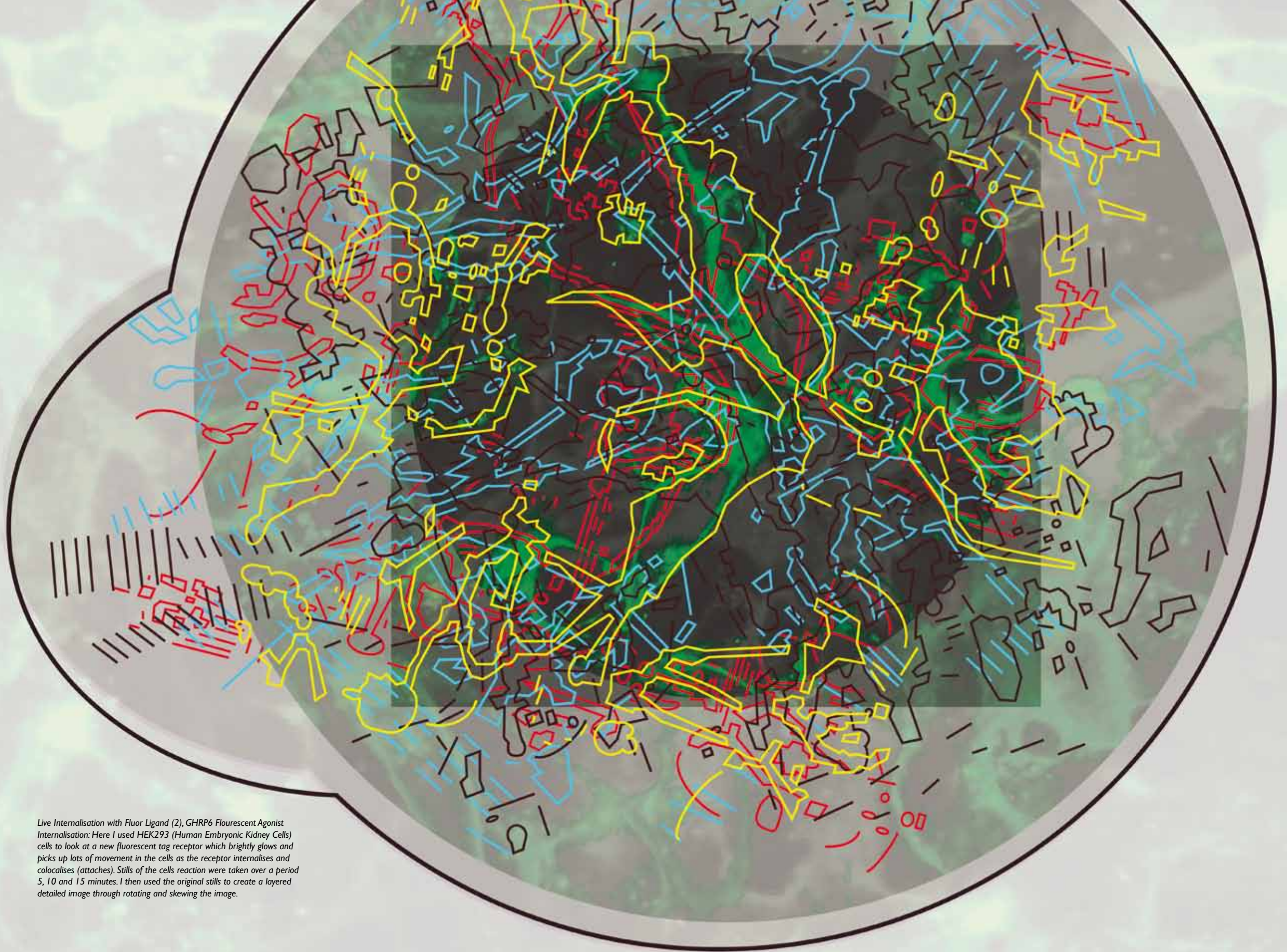
*"Mesmeric, evocative, cosmic and certainly out of the ordinary."*¹



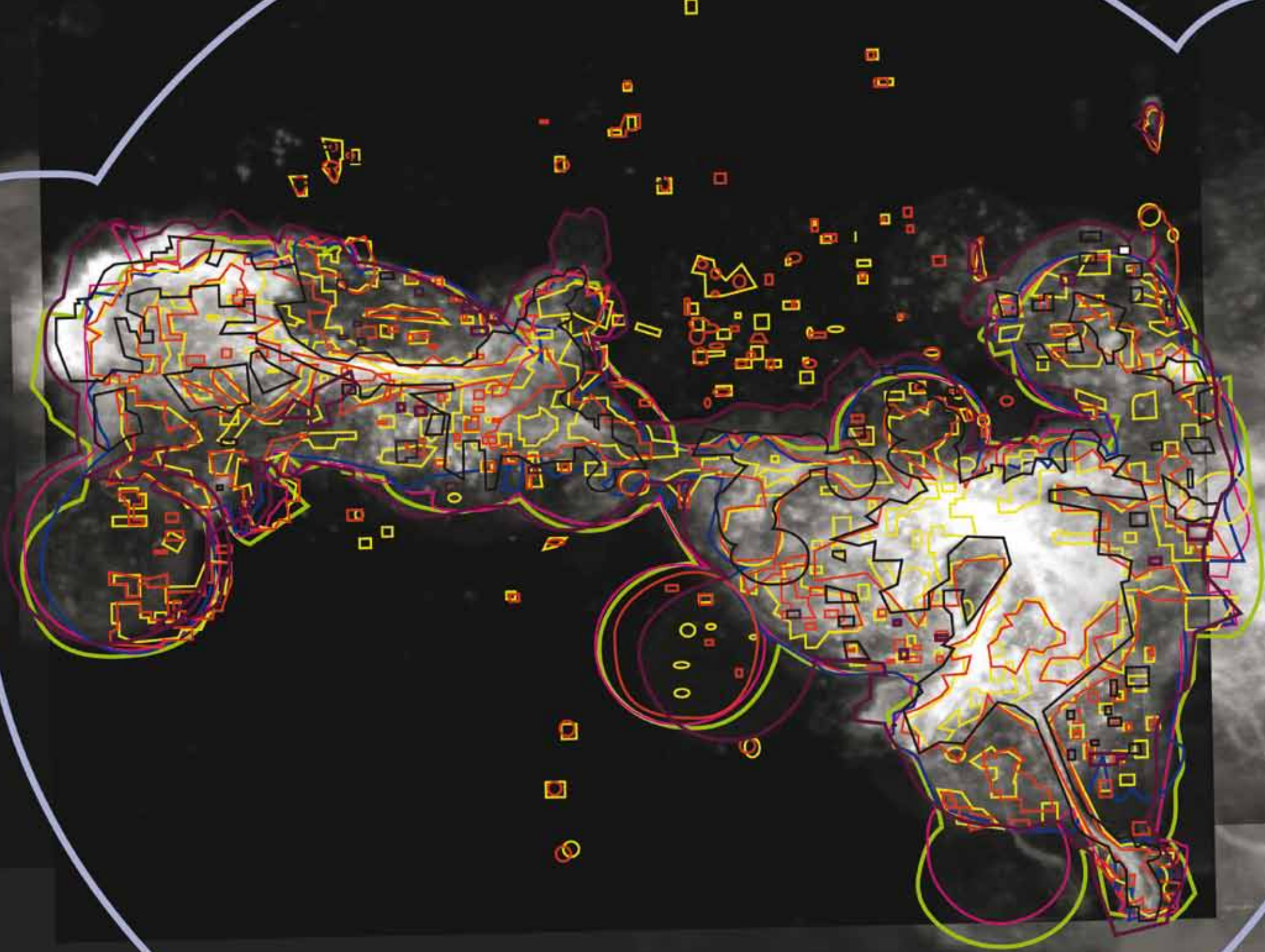
Photographed by Andrew Robinson

Ghrelin Internalisation: I again used HEK293 cells to look at fat receptors: the hunger hormone ghrelin was added and the cells' reaction was filmed for twenty minutes. Zeiss Software was used to create a Stereo Version of the cells and I coloured each channel of the cells in different colours from the original to give a completely different perspective of cells. They became unrecognisable as cells, other worldly, amorphous and unique. I designed the work with the digital drawing and image I had created. The digital drawing is a design template to create layered laser cut illuminated artwork. This is shown on the opposite page with the large image and two details which are lit with LED lighting. The profile shape resembles a piece of armour, a knight's shield perhaps. I suppose it's the surreal combinations of imagery and associations I find really appealing. This artwork was developed to be a more complete digital poster and has already been shown in prominent locations in Derby's Market Square.

"There is a sense that the machines have stifled the creative impulse....then a chaotic cloud disrupts the uniform calm and the fun begins."²



Live Internalisation with Fluor Ligand (2), GHRP6 Fluorescent Agonist
Internalisation: Here I used HEK293 (Human Embryonic Kidney Cells) cells to look at a new fluorescent tag receptor which brightly glows and picks up lots of movement in the cells as the receptor internalises and colocalises (attaches). Stills of the cells reaction were taken over a period 5, 10 and 15 minutes. I then used the original stills to create a layered detailed image through rotating and skewing the image.



Calcium signalling: Using HEK 293 cells (Human Embryonic cells), the hunger hormone ghrelin was added and the reaction filmed for 15 minutes. I used the laboratory's Zeiss software to create a movie of the cells. Then I took stills from the movie at 5 second intervals to form the basis for this drawing using each image to create a layered digital drawing, which will form part of the light box. The overall shape of the light box was created to resemble a creature with bunny ears, a bit like the image I was studying.



Ghrelín Internalisation: Stills taken from fantastic stereo images that have been layered and collaged together.

“Ancient and contemporary worlds collide with a stunning display.....the results are literally electric. Unforgettable.”³

Jo Berry
www.joberry.co.uk
www.joberry-artist.blogspot.com

Originally from Burnley, Jo has studied natural history illustration, illustration, graphic design and printmaking. Exhibiting regularly and widely throughout the country for over 12 years, her work is highly regarded, with pieces in the Victoria & Albert Museum (V&A) and Arts Council England (ACE) East Midland Office in Nottingham.

Her residencies include a year at the Florence Trust Studio in London, and her public art commissions have involved work for Millfield Sculpture Commission, Derbyshire Moorlands and Sheffield Galleries and Museums Trust.

In 2005 she completed work at Loughborough University as an Advanced Research Fellow; research which significantly developed her interest in drawing digitally to create inspirational ‘light drawings’ through the application of industrial laser technology and commercial computer software.

Since then, she has been continuing to develop and explore her understanding of technological processes in order to push the boundaries and

possibilities in the design and production of site-specific artwork for unusual architectural (indoor and outdoor) spaces, through exhibitions and public art commissions.

Before starting the research project at Nottingham University, Jo spent time developing new ways to create customised sculptural light drawing samples, both for interior and exterior locations, through the use of digital technologies, high-end lighting devices (such as LEDS) and new fabrication techniques. Jo also has a 15-year teaching career and has lectured in Fine Art and Creative Art Practice at Sheffield Hallam University. She is married with three children and lives in Carsington, Derbyshire.

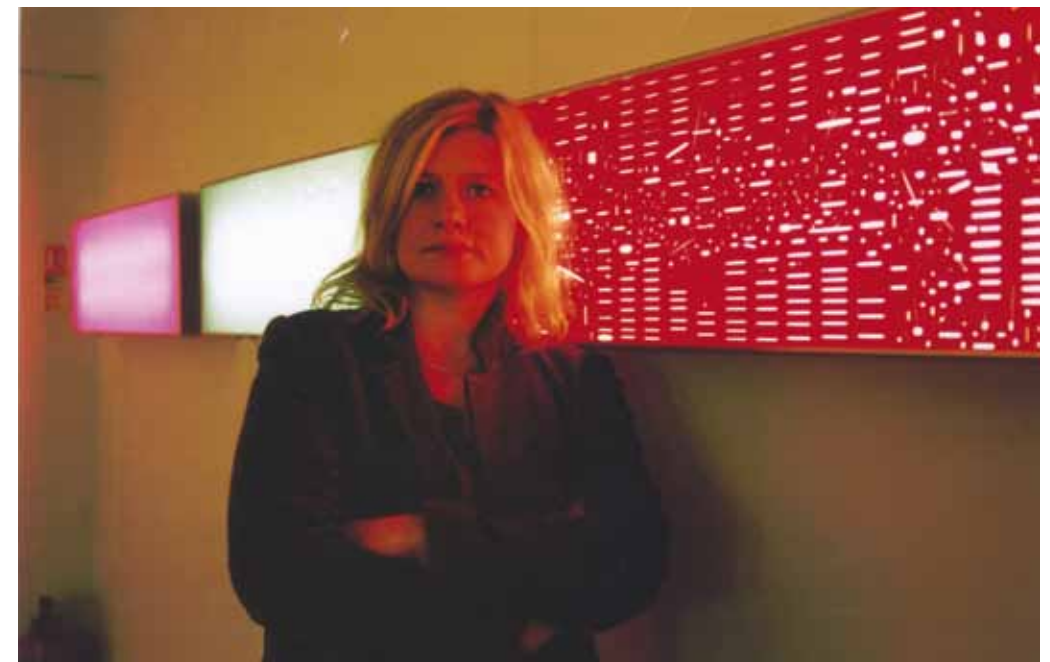
Her new series of work, which was exhibited in Derby this year, was her most ambitious project to date.

Plaudits for Jo’s work:

¹Translation 2 (2006), *Explorer magazine*

²Order, Regimentation, Collision (2004), *The Independent*

³ *Lincolnshire Journal*



Jo Berry Exhibition dates

Exhibition dates of the project are the 23rd July 2011 to 30th October 2011. Exciting strands of this diverse project can be seen at:

- The main exhibition will take place at Derby Museum & Art Gallery, The Strand, Derby, DE1 1BS, from 23rd July 2011 to 30th October 2011.
- Royal Derby Hospital (level 5 near cafe).
- Graphic Vinyl Signs:
Derby Museum & Art Gallery, 3 windows on Gibson Street. Optimum Gifts Ltd., 38/40 The Strand, Derby, The Wonky Table, 32-33 Sadler Gate, Derby.
- BBC Big Screen, Market Place, Derby.
- The work will be shown in the School of Biomedical Science at Nottingham Medical School in corridors C supported by the Dean's Art Initiative plus a presentation to the staff and students of the Medical School.
- 11th October 2011: Printed Artwork, Animations and Art Documentary to be shown at the Grand Opening of the new Zeiss headquarters in Munchen, Germany.
- Lightboxes and Digital Artwork to be shown at Lakeside Gallery, Nottingham University, and the main university site from Saturday 25th February to Monday 9th April 2012 [6 weeks].

Further reading

1. www.mutualart.com art focus "Under the Microscope: Art on a Cellular Level" published 18th May 2011
2. <http://www.telegraph.co.uk/culture/art/art-news/8383363/Artist-uses-live-cells-to-create-new-form-of-design.html>
3. <http://www.wellcome.ac.uk/News/Media-office/Press-releases/2011/WTVM051939.htm>
4. Images to be published in Pharmacology Matters. Next issue.
5. Whats Hot & News Article
www.artsderbysire.org.uk
6. Zeiss customer email newsletter and customer magazine.
7. Zeiss company page on facebook
<http://www.facebook.com/zeissmicroscopy>
8. Wellcome Trust's magazine "Wellcome News" (www.wellcome.ac.uk/wellcomenews) Issue 67, summer 2011
9. Derby Telegraph